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ABSTRACT

The proceedings of the first International Conference of the North American Association for Environmental Education (NAEE), which was also the 13th annual conference of the National Association of Environmental Education as the NAEE was formerly known, provides as complete a record as possible of the conference activities. Papers and reports are listed alphabetically by presenters in 10 general sections. Keynote speeches are given full length while abstracts of 1500 words or less are given for the remaining papers. Sections included are: (1) major addresses (representing perspectives from Canada, the United Nations, the United States, and Australia); (2) Banff Declaration (affirming a commitment to a new governmental ethic); (3) sections workshop report (focusing on ecological sustainable development); (4) international issues and actions (reviewing programs and conditions in Swaziland, Brazil, Barbados, Norway, India, Egypt, New Zealand, and Thailand); (5) governmental roles (including a symposium on Canada/U.S. relations and panels on information systems and a national center for environmental education); (6) issues (covering such topics as acid rain, nuclear arms, toxic substances, and population); (7) nonformal education (considering parks, centers, churches, and environmental history); (8) tertiary education (examining training programs); (9) curriculum (describing outdoor progress, community issues, technology, energy, and computers); and (10) research (reporting on attitudes, behaviors, cognitive models, evaluation, and curriculum materials). (ML)

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North American Association for Environmental Education

International Perspectives on Environmental Education: Issues and Actions

1984

Conference

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INTERNATIONAL PERSPECTIVES ON ENVIRONMENTAL EDUCATION: ISSUES AND ACTIONS

1984

Conference

Selected Papers from the Thirteenth Annual
Conference of the North American
Association for Environmental Education

Edited by

Dorothy A. Cox
William B. Stapp

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PREFACE

This is the proceedings of the first International Conference of the North American Association for Environmental Education (NAEE). This also documents the 13th annual conference of NAEE (formerly known as the National Association of Environmental Education). The conference was held from October 5 to 9, 1984, at the Chateau Lake Louise Hotel in Banff National Park near the townsite of Lake Louise in Alberta, Canada. The conference featured five keynote addresses, over 12 invited speakers, 13 workshops, 10 panels and symposia, and over 75 contributed papers. While more than 10 field trips were available before, after, and during the conference, one entire afternoon was devoted to interpretive field sessions in order that everyone would be able to enjoy and learn from the spectacular Canadian Rockies environment. The conference began with over 100 participants meeting in a two-day workshop developed by the combined planning of the three NAEE Sections. (See their report in Part III.) One of the significant conference outcomes was the adoption by the participants of the Banff Declaration. (See Part II.) Over 350 individuals attended the conference from 28 countries representing all regions of the world.

Participating in the Conference with NAEE was The American Society for Environmental History, a society which provides a coordinating network of environmental historians and professionals in environmental science, humanities, and social sciences. The ASEH presented four panel presentations as a part of the conference.

The purpose of this proceedings is to provide as complete a record as possible of the annual conference activities.

This proceedings contains ten sections. Papers and reports are grouped by general topic with presentors listed alphabetically within each section. Major addresses are full length; all others have been edited to approximately 1500 words or less. If a long abstract was not submitted by an author, the short abstract (from the conference program) is included to complete the record of the conference. In a few cases no text or abstract has been available, but the presentation is listed by title to indicate that a presentation was made.

The editors most gratefully thank Gloria Stapp, Giovanna DiChiro, Lori Mann, Martha Monroe, and Debra Yandala for their invaluable contribution in reading and editing papers; Arthur Sacks for arranging for the typing to be done at the Institute for Environmental Studies, University of Wisconsin, Madison, Wisconsin; and Joan Heidelberg for handling a myriad of details that made our job so much easier.

Dorothy A. Cox
William B. Stapp
Co-editors

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I.A. Bradley, Honourable Fred D., Minister of the Environment, Alberta, Canada.

It is a distinct pleasure to be invited to address you this evening. I note there are people attending this conference from all over the world, South America, Africa, Europe, Asia, Australia, North America and in particular our neighbours from the United States. On behalf of the Alberta Government I would like to welcome all of you to Canada and Alberta and to Lake Louise.

I would like to commend the North American Association of Environmental Education on its decision to go 'continental' and demonstrate this by holding this conference in Alberta. I think you will agree that you could not have chosen a more beautiful and tranquil site than Lake Louise for your activities. It is a truly magnificent example of a natural environment. However, I'm sure that you all bring with you concerns and reports about other environments --your local environments--and through sharing, the focus of this gathering will become the 'global environment'.

Understanding global environmental conditions and needs is difficult, even for those who make it their profession to understand. Connecting local initiatives and actions to the global view and needs of environment is difficult, even for those committed to undertaking such initiatives and actions. As minister responsible for the sustenance of a quality environment in one small region of this globe I applaud those professionals who understand and work toward this goal accordingly.

However, I reserve a special respect for those professionals who attempt, as you do, through educational programming, to address the complexities of global environmental conditions to students, communities and diverse publics. This respect is heightened when I see the attempts made to develop an interest and involvement of these same audiences in their local environments, to act locally, to foster a lifestyle cognizant of the need to sustain a quality environment.

However, education about and for the environment cannot be left to the professionals alone. I firmly believe that education is a responsibility of society as a whole and that includes matters of the environment. It is through education that the foundation for meaningful discussion between differing value-oriented groups on environmental issues can occur. It is the foundation for trust and understanding between proponents and dissentors of developments affecting the quality of the physical environment. It nourishes the roots of a developing empathy for others needs and aspirations.

Alberta Environment is in this business of education because ultimately decisions have to be made, some value positions supported and some rejected. It is to our interest that the public understands the basis for these decisions. But education is dynamic--it flows both ways. As with an agency that makes decisions about the environment there is a need for us to be part of the educational program as recipient. Alberta Environment will undoubtedly learn much from the proceedings of this conference.

Alberta environmental educators have instituted a number of initiatives of which we can be rightly proud and that demonstrate the directions and commitment that the province has made to environmental education. Proudly, we can say that the environmental education movement in this province was achieved through broad grass roots support. The involvement of teachers, recreational leaders, naturalists, interpretors, university and college faculties, environmentalists and parents concerned with quality learning experiences for their children in and about the environment must be recognized. These are the people who initiated programs, who acted and led others to act.

Though our history in environmental education is not long, at least in the formal sense, the list of achievements and depth of programming is truly astonishing. The list of school-based and community environmental projects numbers in the thousands. The efforts to interpret the school curriculum to incorporate environmental topics have been extensive. The development of local resource materials to support both school and community programs has mushroomed. Formal and informal organizing and networking to improve communications and coordination of effort and resources continues to grow.

In support of these efforts the Alberta Government has provided extensive assistance for the past fifteen years. At present, eleven government departments, services and agencies actively support formal and informal educational efforts on the environment. Direction for formal environmental education lies dually with Alberta Education and Alberta Advanced Education. Alberta Education is reviewing, with the university community, the possibility of providing credit instruction in environmental education at both graduate and undergraduate levels.

Support for specific program development and special projects has been afforded by other government departments. Three of these have been notably active in the field of environmental education. Alberta Recreation and Parks has perhaps the longest history of support offered in the area of environmental and outdoor education. With initial efforts at the Blue Lake Centre to provide leadership training still continuing today, this department has broadened its support to include: grant funding of special and innovative projects; provision of equipment and supplies; initiating community-based leadership programs; development of support materials; and, leadership, consultation and coordination services through its many professional staff.

Alberta Energy and Natural Resources has, through three of its branches, developed a broad array of resources available to environmental educators. Project WILD, Hunter Training, the Energy Conservation Program and Junior Forest Wardens are just a few of the programs reaching out to serve educators of our natural resources.

The department which I am responsible for, Alberta Environment, has also offered extensive support to educators for more than a decade. Our involvement has been in program development and teacher/leader inservice. Lately, programs focusing on environmental issues and addressing core curriculum in the schools have been the focus of most of our educational efforts in the department. We feel that we have been, and will continue to be, responsive to the needs of environmental educators in this province.

One should not forget that in this resource rich province there is one other major source of support for education of the environment. Industry has played a major role in support of environmental education though often of an indirect nature. Support for relevant programming has often come through funding of special programs. An excellent, and perhaps the finest example of industry's support of environnmental education has its roots in Alberta. The SEEDS Foundation, of which I am sure that many of you are familiar, demonstrates what can happen when industry is included in the educational process.

I encourage you to attend the presentations made by Alberta government staff and to view the displays outlining some of the programs that have been developed here in Alberta.

Dr. Stapp, Alberta educators are fortunate in your association's choice of this part of Canada to hold your conference. It provides us with a unique opportunity to learn from you--as we have learned by more indirect means in the past. However, we do hope that this learning will not all be one way. One would hope that in your discussions, delivery of papers, formal sessions, and field trips, you will learn extensively from each other and perhaps come to appreciate the directions and growth of environmental education in Alberta.

In closing, I would like to leave one thought with you:

A Quality Environment is a sound economic investment.

The challenge for policy makers is to recognize that short term decisions which don't address environment protection, i.e. air, water and land quality, may result in longer term economic, social and environmental costs. I.E. ACID RAIN. Governments are now discussing taking action on the clean-up of acid rain producing industries. The question of cost and who is going to pay is a serious question. There is no doubt that society will be asked to bear some of these costs.

Had decision makers known the cost of clean-up cost to reduce acid rain today, I am sure that they would have recognized that pollution abatement and control would have made sound economic sense back when these industrial developments were approved.

Environmental Education, I believe, must include selling environmental protection as sound economics.

I note from your agenda you will have plenty of time to take in Alberta's natural environment. Enjoy yourselves and please take time to see some of the other features of our diverse and beautiful province and country.

May I take this opportunity to wish you all the best, that you have a successful conference, and that your efforts on behalf of the environment everywhere are successful also.

I.B. Fraser, John, "Status of Environmental Education Issues in Canada." Minister of Fisheries and Oceans, House of Commons, Vancouver, South, 120 Federations Building, Ottawa, Ontario, K1A 0E6, Canada.

I'd like to begin by bringing you greetings from the Honourable Suzanne Blais-Grenier, Minister of Environment. I'm delighted to meet with you again. The last occasion, as some of you may recall, was at your 1982 meeting in Lake George, New York.

When Bill Stapp invited me to this Conference last February, he mentioned that your group had changed its name from the National Association for Environment Education to the North American Association for Environment Education.

I applaud the change for two reasons. First because your new name does reflect the reality that when we North Americans start thinking about our environmental problems, we pretty soon come up against the reality that they don't fit neatly on either side of the 49th parallel, or indeed on either side of state and provincial boundaries. The other reason is a little more prosaic. By changing your name you've given me an excellent opener for the point I hope to make in this address.

Which in simple terms is this: The environmental agenda confronting us is made up very largely of issues which are simply too large, too all-embracing, and too complex to be treated as purely domestic concerns. Most are international, and many are global in their ecological implications and also in their political implications. Whether the aim is to defeat long range air pollution across national borders or to develop a coherent water management policy within borders, success for the governments involved depends on wide horizons.

Our conceptual horizons are being stretched by two forces. One of these is the impact of modern technology and industrialization. The pressure of the human race on the environment grows heavier by the day. Our numbers multiply, we burn more energy, we consume more of our resources, we assail air and water and land with new and more persistent chemical combinations. In this crowded, mechanized world, environmental problems don't fit neatly within the lines on a map, parish pump politics don't generate solutions. What one nation or state or province does affects other jurisdictions; polluters and polluted are reminded constantly that they are not in separate worlds. In that sense we are learning by hard experience. In a more positive way, our concepts are being widened by scientific discovery. We know more than we did. We are finding out that environmentally we are linked in ways we did not previously realize.

My perspective on these changes is not that of a scientist or an ecologist, but of a member of the government with a responsibility to the public. As a former Minister of Environment and now as Minister of Fisheries and Oceans, I have a special interest in environmental politics. I've been particularly fascinated by the political process -- the chemistry -- by which, in an open society like ours, new understanding of environmental problems translates eventually into concrete environmental action. Along the way I've also come to understand the significance to that process of informed and active groups such as this one. With that in mind, I want to pass on some observations about the way the process has worked in the past, and go on from that to how I think it will have to work in the future.

In the case of purely national problem solving, you can usually divide the process roughly into three phases. In Phase One, the problem is spotted, so to speak, from the crow's nest by the scientific lookout, the person with a special informed interest in the problem. In Phase Two the alarm is sounded, usually by groups like this one. Then and only then is the latent political power of public opinion mobilized and focused. In Phase Three you get political action. We saw that sequence in the 1960's. It took a long time to go from Phase One to Two, but beyond that point, action came very quickly.

And with good reason, a great deal of political energy was being generated in a very direct way. In most cases, polluters and the polluted were neighbors and fellow citizens. Environmental constituencies came naturally into existence. Political pressure could be quickly mobilized and readily translated into corrective measures.

When the problems were international, events followed a somewhat different scenario. In the case of the Great Lakes for instance, environmental problems festered quietly for decades. Action did not come until it was compelled by something close to catastrophe. One reason was, undoubtedly, environmental ignorance. People didn't understand the deterioration and what it meant to their communities. Another was the existence of borders, not just the ones drawn on maps between nations and provinces and states, but the crucial ones which limit our definitions of the possible.

These conceptual barriers have been broken in the past. Around the turn of the century, Americans and Canadians were discovering that there were certain environmental problems, including minor disputes about fisheries and water that could not be solved unilaterally. That discovery lead to the Boundary Waters Treaty of 1909. And the treaty in turn led to the establishment of the International Joint Commission, which in spirit and accomplishment has given us some of the world's most encouraging examples of international cooperation on environmental matters. In the ensuing 50 years the IJC conducted many studies of trouble spots in the Lakes and other shared waters. In the mid 1960's the Commission was authorized to investigate the build up of eutrophication in the Lakes, particularly in Lake Erie. And in the early 1970's, impelled and reinforced I'm sure by the environmental movement of the era, Canada and the United States launched their massive joint cleanup of the Lakes under the Great Lakes Water Quality Agreement.

The arrival of the sea lamprey, via the Welland Canal, was the disaster to the fisheries of the Lakes that prompted action. The lamprey wrought so much devastation among prime stocks of lake trout and whitefish that it could not be ignored.

Congress, Parliament, the state houses on the American side, and the legislature in Ontario, all saw the light. That awakening led to the formation of the Great Lakes Fishery Commission and a highly successful international attack against the lamprey.

But the real test of our ability to respond in a transboundary way to transboundary challenges came much later with acid rain. In this instance, with one or two significant changes in the cast of characters, the three phase sequence I've talked about, did in fact occur. There was certainly a time lag between Phase One and Phase Two. Scientists had published reports on acid rain in Canada and the United States in the early 1970's. But not until 1979 did acid rain become a public issue and it achieved that status in a different way from the issues of the 1960's. The constituency for cleanup could not come together spontaneously in this case on the basis of perceived common interest. For one thing, the pollution itself was insidious and stealthy. For another, the makers of acid rain and those on whom it fell were on different sides of nation, state and provincial borders. The polluter's victims couldn't reach him, and the polluter's neighbors didn't care. That raised the question about the political process, how, in this situation without smog and bellyup fish could you mobilize a constituency for cleanup? The situation, in fact, called for politicians to assume the role of bell ringer. Our task, as Minister of Environment at the time, was one in which I was directly involved, not just to reflect and transmit public will, but to raise awareness. The task, in fact, was to mobilize a constituency against acid rain. Not just a national constituency but one that represented all the afflicted in all jurisdictions, a North American constituency, a coalition we hoped, of the rained-upon. The only way we could do that was by Canadians and Americans moving out from behind some of the conceptual fences and talking directly to each other as members of one transboundary constituency.

That constituency took hold and it exists today. On both sides of the national border and on both sides of state and provincial borders, Canadian and American politicians, supported by environmental groups, have discovered, proclaimed and acted upon their common interest. They have found their allies and, as you would expect, their opponents on both sides of national and other boundaries. Their operational premise is that acid rain is not Canada's problem or the problem of the United States. It is North America's problem. In fisheries terms the acid rain casualties include not only Nova Scotia salmon but trout in the Adirondacks. The zones of devastation include not only thousands of Ontario lakes, but hundreds of miles of fishless streams in Great Smoky National Park, and many more in Pennsylvania.

I'm not here to claim that the process has in fact carried us to a successful conclusion. It hasn't. Acid rain continues to fall -- we are still in the midst of an unfolding North American ecological tragedy. But in at least one respect there has been progress, that transboundary constituency exists. And, given the new and more constructive relationship that exists in Canada-U.S. relations, we can look with optimism to the future.

In my present job, I'm Minister not only of Fisheries but Oceans. It is an area on which we will be placing more emphasis in the future. It's also an area with its full share of environmental problems and interconnections -- some of which we are only beginning to understand.

One example in El Nino -- an ocean phenomenon characterized by the sudden intrusion of warm waters into parts of the ocean which are normally cool. As recently as the 1960's it was thought of as a purely regional phenomenon confined to the waters of the eastern Pacific off Latin America. We know today it's a global one, with impacts on climate that register throughout the entire equatorial area of the planet. The El Nino of 1982-1983 caused simultaneously, the worst drought of the century in Australia, devastating rains in parts of the southern United States and Latin America, and some of the worst hurricanes ever to hit Tahiti and other islands of the south central Pacific. In Canada, El Nino resulted in one of the mildest winters recorded in British Columbia, and considerable changes in the migrations of fish stocks.

This train of events illustrate a definite relationship between the dynamics of ocean and climate. Scientists say it is possible to learn enough about the cause-and-effect relationships to make the effects predictable, and the economic and other benefits of that would be immense.

The problem is that no one nation has enough of the pieces to complete the puzzle alone. If we are to understand El Nino and benefit from that understanding, we must seek the answers together. And in this case, too, we need to begin with the uncomfortable exercise of discarding familiar and obsolete concepts. We need to go on from there to mobilize a constituency to support this effort. In this case, one with a hemispheric field of vision.

I want to turn now to an issue that probably makes the case for a new politics of the environment better than any other. I mean the documented, ominous buildup of carbon dioxide in the atmosphere, the so-called "greenhouse effect."

As a measuring stick for the relevance of our political concepts and institutions, this is probably the most instructive issue of the lot. It exhibits many of the characteristics of the new breed of environmental challenge. Like acid rain it is insidious. It isn't something you can see or feel. At this point, if this problem registers in the public mind at all, it does so in terms of dry scientific measurements and speculations about effects in what seems to be a safely distant future. As with acid rain one of the challenges it poses is simply convincing people that there really is something out there to be worrying about. And yet what we are confronted with here is a problem that knowledgeable and cautious people have called the most profound environmental issue facing humanity.

Let's review the facts. Massive amounts of CO_2 are being released into the atmosphere through the burning of fossil fuels. Roughly half of that amount is staying in the atmosphere where, in simple terms, it acts as a thermal mirror, passing the reflected heat from our planet back to earth. We're told, on good authority, that the CO_2 loading of the atmosphere will double over the next 70 to 100 years. If that happens, according to some forecasters the average temperature of the earth could rise by two per cent. That's a worldwide average. In high latitude countries it would probably be more. Some experts say, for instance, that the increase in Canada would not be two per cent but anywhere from four to eight per cent.

One needs to make a mental effort to translate these dry numerical predictions into a picture of the physical results. The predictions vary from pessimistic to reasonably bright, from slight improvements for some regions, to absolute disasters for others. Some studies suggest that the Western prairies could become deserts. The icecaps would diminish. The water they release would lift the ocean level and put many areas including, I believe, 30% of the state of Florida underwater.

Looking this grim scene over, one has to ask whether the greenhouse effect is a good illustration of the need for wider environmental constitutencies. With a problem so immense, is it likely that any responses would be adequate? We can't take all the traffic off the roads. We can't ground all the aircraft. We can't turn off the heat and the lights all over the world.

It is a reasonable question. The answer is that there are things we can and must do. We must learn more about the phenomenon itself. We need to chart its progress more precisely, we must define its timetable. That missing half of CO_2 that isn't getting into the atmosphere needs to be located. Presumably it's going into the ocean. If so, how much CO_2 can the oceans absorb? What influence should the greenhouse effect have on our plans for energy development? What should we be doing to avert some of the stock and dislocation that changes will bring to some regions? What should we be doing to benefit from climatic changes that favor some regions?

To say that we in Canada are interested in climate variations of any kind is an understatement. We live in a narrow margin of climate. A couple of degrees one way or another, sustained long enough, can make us or break us. Fisheries, forestry, agriculture, those three sectors are pillars of our national life. All three are sensitive to climate variations.

No single discipline is incisive enough to comprehend the problem. No one country is large enough or rich enough to answer the questions single handed. So this too is an area where the world has been dragged kicking and struggling by stark environmental realities into global collaboration. In this case the mechanism is the World Climate Program coordinated through the U.N. system. This country is making its contribution. The Canadian Climate Centre was established by Environment Canada eight years ago and it coordinates a general Canadian Climate Program. Canada has been monitoring CO_2 in the atmosphere since 1969. The Institute of Ocean Sciences, has been a leader in the study of CO_2 levels in the Pacific Ocean using its own vessels and commercial ships as measurement platforms.

To sum it up, this is a time when the challenge of preserving the human environment has become a challenge to our perception of our ability to adapt to change. Your group has a crucial role to play. You are capable of greater maneuverability. You can adapt more quickly than rigid government organizations. New environmental challenges have produced this new cross boundary, in some cases global constituency. It is a constituency made up of people concerned about where we are going, people who are not going to care much about quill-pen diplomacy, people who will form together in coalitions that are skeptical about protocols as a way to achieve goals - coalitions that will not hesitate to cross boundaries no matter how upset traditionalists may get about it. You in this Association should be the natural leaders and mobilizers of this coalition, throughout North America as your new title suggests, and globally too, if that's what's required.

In closing, I'd like to return to the subject of acid rain and in particular to the challenge it makes to our preception. We have made agonizingly slow progress toward the joint effort we need. Nevertheless, there are signs that the international transboundary consciousness is evolving, that the constituency for the environment is gaining strength.

We have some progress to show. In 1979 Canada and the United States joined with member nations of the European Economic Community in signing the Convention on Long-Range Transboundary Air Pollution. That Convention is now in force. It requires the countries who signed it to exchange information on control strategies, to conduct research, and to take account of transboundary pollution in the planning of new plants that emit sulphur dioxide. Canada and nine other nations now belong to the "30 per cent club", countries which have pledged to cut SO_2 emissions by at least 30%. Membership in this club is not closed; other nations are welcome.

We Canadians have gone even further. Canada has pledged to begin its own attack on acid rain aiming for a 50% reduction in Sulpher dioxide emissions based on 1980 levels by 1994. We realize in doing so that this action alone will not solve the problem, but we are confident that in time, the United States will join us in this work to preserve our common heritage. We are confident, in short, that the transboundary heritage will prevail.

I.C. Brown, Noel, "The International Environment." Director, New York Liason Office, United Nations Environment Program, United Nations Building, New York, New York, USA.

(Speech not available at this printing.)

I.D. Baez, Albert V., "The World Conservation Strategy and Environmental Education." Chairman, IUCN Commission on Education, Greenbrae, California, USA.

INTRODUCTION

We are here to try to implement the now famous adage of Rene Dubois to "think globally and act locally". My purpose today is to remind you of the role that the World Conservation Strategy of the International Union for Conservation of Nature and Natural Resources (IUCN) has played and can continue to play in implementing Dubois' admonition.

Many of you work on local environmental problems possibly without considering their global implications but some of us, I am afraid, are so caught up in international work and concentrating on the global issues that we have no time to get involved in local problems thereby running the risk of losing touch with the local reality. Both groups must, obviously, strive for a better balance (1).

I am delighted to be in Banff for the first time. I can see at least one reason why so many of us were attracted to come to this Conference. The legendary natural beauty of Banff reminds us of what the Earth can be like when it is not ravaged by the careless impact of modern technological society. It is a fit place to celebrate the causes of conservation and environmental education.

Canada has been kind to me in providing a platform for the expression of my views on enviornmental education. The last occasion was the Man Environment Impact Conference held in Ontario in 1982 and I would like to begin my talk today where I left off then. In my concluding remarks there I pointed out that the long-term implementation of the goals of IUCN's World Conservation Strategy demands the development of a world environmental education strategy whose main objective would be to infuse an environmental ethic into all educational activities worldwide.

Two years have passed since the Ontario conference. There has been a great deal of activity in environmental education worldwide. My term of office with IUCN is coming to an end and before it does I would like to make two suggestions to the Banff conference in order not to lose the momentum which has been gained. One is that the topic of a world environmental education strategy be kept alive and elaborated during this conference and another is that you issue, in the name of the Conference, a resolution or a declaration which supports worldwide cooperation for environmental education. It might be called the Banff Declaration.

I will return to these topics later.

THE WORLD CONSERVATION STRATEGY

Most of you in this audience already know about the World Conservation Strategy (2). For the benefit of those who don't, however, I shall begin by giving a brief review of this important document, how it came about and what role it can play in giving environmental education a global focus.

I will then discuss some areas where the message of the Strategy needs to be augmented from the point of view of education and, finally, I will express some thoughts on how to get started on a world environmental education strategy and a Banff declaration.

In what follows I will be quoting freely from the Strategy and from the booklet titled "An Introduction to the World Conservation Strategy" (3) which was written by Stan Croner to present the Strategy in non-technical language illustrated with striking photographs by world-renowned photographers. And at the end of my talk we will screen Mark Boulton's new audio visual presentation titled "Planning for Survival" to further illustrate the concerns of the World Conservation Strategy.

The World Conservation Strategy has been called "a blueprint for survival." It is a 72-page document that directs the world's attention to the increasingly dangerous stresses being put on the earth's biological systems and recommends measures for relieving them. It represents the efforts of more than 450 government agencies and conservation organizations, and more than 700 scientists and other specialists from round the world working in collaboration with IUCN, the World Wildlife Fund (WWF), and with the support of the United Nations Environment Programme (UNEP).

The goal of the Strategy is the integration of conservation and development to ensure that modifications to the planet do indeed secure the survival and well-being of all people. It calls on all the nations to adopt conservation policies and practices at home, to join international efforts to improve the human environment worldwide, and to protect the biosphere that sustains all life on earth.

The main purpose of the Strategy is to persuade the nations of the world to adopt ecologically sound development practices. The Strategy provides remedies, applicable worldwide, for the on-going destruction of nature that casts such a dark shadow over the future of our species. It points the way for development-minded and conservation-minded people to unite in a common drive toward survival and a life of dignity for all people on the shared planet.

The Problem - A Deteriorating Planet

The World Conservation Strategy addresses itself to the problem of a deteriorating planet. The biosphere, the earth's thin layer of air, water, soil and living things that sustains us is deteriorating because of the burdens put on it by our increasing numbers and needs. The combined destructive impacts of a poor majority struggling to stay alive and an affluent minority consuming most of the world's resources are undermining the very means by which all people can survive and flourish.

By the end of the century there will be about 6,000 million people on the earth and four fifths of them will be in the Third World. More than 2,000 million people today are landless peasants in the developing countries. Caught in a daily struggle for enough food and fuel to stay alive, they strip the land bare of trees and bushes for firewood. They overgraze grassy drylands and overfish and overhunt local wildlife. Many migrate to crowded cities where they find shelter in slums and shanty towns often falling victim to hunger and disease. Such widespread poverty has resulted in the devastation of large areas of once-fertile land on three continents.

Only about 25% of the world's people live in the developed, richer nations of Europe and North America, and in countries such as Japan and Australia and the OPEC nations. Yet these countries account for 80% of the world's consumption of resources. The developed nations also suffer the ills of environmental abuse. In many developed countries forests are being logged faster that trees are growing. Pollutants, the side products of industrialization and high consumption, continue to degrade the air and poison ground water supplies, rivers, lakes and coastal waters (4).

The earth, if it is to provide the means by which all people can survive and prosper, can no longer tolerate the destruction of living systems by either the poorer or the richer nations. It is the task of this generation to act to reverse the damaging trends that are making the planet less and less fit to live on.

The World Conservation Strategy points the way to what must be done if we are to satisfy the needs of the world's people and, at the same time, preserve the earth's living systems on which all life depends for survival.

The first objective: to maintain ecological processes and life support systems.

If the earth is to be able to support its growing human population, we must, according to the Strategy, make certain its essential ecological processes and life support systems are maintained and functioning properly. It defines and illustrates the meaning of these important concepts. It points out, for example, that at the rate agricultural lands are being damaged by erosion and poor irrigation practices, and being put to uses other than farming, in 20 years close to a third of the world's arable land will be unsuitable for growing crops. If the rate of loss continues, it will likely result in famines and human misery on a scale never before known in human history. It considers, in particular the important roles played by tropical forest systems, coastal wetlands and fresh water systems. The Strategy provides guidelines for the protection and maintenance of the earth's life support systems.

The second objective: to perserve genetic diversity.

The Strategy's second main objective for keeping the earth habitable for humans is the preservation of genetic diversity. This means taking steps to ensure that the earth's many species of plants and animals are protected from extinction. The greatest threat comes from the destruction and degradation of habitats. The most serious threat to genetic diversity is the continuing destruction of tropical rain forests, the most species-rich land environments on earth. Because half of all plant and animal species live in these forests, their destuction would result in the mass extinctions that would permanently impoverish the planet.

There are other reasons for preserving the species which are not stressed in the Strategy but which, according to Stan Croner, are important in the development of an environmental ethic. Simple human compassion is one. Respecting the rights of other kinds of life to exist is another. The extraordinary beauty of natural forms is yet another. Perhaps most important, we are obligated to our descendants not to leave the earth less alive, less interesting and less wondrous because we have been here.

The Strategy calls on all governments to participate in international programs and treaties designed to preserve the world's genetic resources. And because the earth's gene pool is a common heritage of all humankind, the Strategy recommends financial aid to less developed nations to help them preserve the species-rich ecosystems that lie within their border.

The third objective: to ensure the sustainable utilization of species and ecosystems.

One way to consider living resources, forests, soils, water, plants and animals, is to regard them as biological capital available for human use. If we use up this capital, it will no longer produce interest: the food, raw materials and life supporting services we need to survive. Currently, our species is consuming the capital by, for example, overfishing, overgrazing and unsuitable farming practices, denuding the land in search of firewood, through deforestation of watershed forests and by the accidental killing of non-target animals in the nets of fishing fleets.

The Strategy's ultimate goal is a sustainable society. To that end, it calls upon the nations of the world to join international efforts to protect the global commons: the open oceans, the atmosphere and Antarctica and the Southern Ocean.

Choices

In 1982, Mustafa Tolba, Executive Director of the UN Environment Programme issued this blunt warning: "....nations have two choices: to carry on as they are and face by the turn of the century an environmental catastrophe as complete, as irreversible as any nuclear holocaust, or to begin now in earnest a cooperative effort to use the world's resources rationally and fairly".

Someone has called the nuclear holocaust the "fast bang" and environmental ravaging the "slow bang." What Tolba is saying is that the final effect would be the same in either case, the devastation of the planet, its life and its resources.

The Strategy concludes: "Human beings, in their quest for economic development and enjoyment of the riches of nature, must come to terms with the reality of resource limitation and the carrying capacities of ecosystems, and must take into account the needs of future generations. This is the message of conservation."

THE WORLD CONSERVATION STRATEGY AND THE ROLE OF EDUCATION

The World Conservation Strategy is not an educational document. It devotes only one page to education. It concentrates on how education should be used for building support for conservation but it does not spell out in any detail what needs to be done in education, nor who should do it, nor who will fund educational projects. It poses, but does not solve, educational problems. It leaves it to its readers to invent solutions. In other words, it does not propose an environmental education strategy.

But in its defense I must say that the initial paragraph of the section on education in the Strategy is an eloquent statement of the fact that the domain of environmental education is broader than conservation, and that environmental education must have an ethical component. Here it is:

"Ultimately the behavior of entire societies towards the biosphere must be transformed if the achievement of conservation objectives is to be assured. A new ethic, embracing plants and animals as well as people, is required for human societies to live in harmony with the natural world on which they depend for survival and wellbeing. The long term task of environmental education is to foster or reinforce attitudes and behaviour compatible with this new ethic."

For me the infusion of an environmental ethic into all of education has become the most important overall aim of environmental education.

I do not intend to redefine environmental education here. This has been thrashed out in many previous conferences and summarized neatly in the Unesco report titled "Environmental Education in the Light of the Tbilisi Conference".

What I have to contribute are some personal reflections on topics which I feel should be given prominence in devising an environmental education strategy. If you keep in mind my background you will understand and compensate for the biases I might have.

I am a physicist by profession and a science educator as a result of my association with the curriculum reform movements of the Physical Science Study Committee of the U.S., of Unesco, of ICSU and of several other organizations. My comprehension of biological concepts is limited but my acquaintance with science education internationally is broad. I am a peace activist out of conviction and sensitive to the needs of developing countries because I was born in one and worked in several of them. I have been influnced by the recent works of Capra (6) (7), Roszak (8), Berman (13) and Lovelock (14). In the light of this background, then, here are some topics which I believe merit an expanded treatment in the World Conservation Strategy and would be important in the design of an environmental education strategy.

1. Population

As I have stated many times elsewhere (9), of the 4 P's: population, pollution, poverty and the problems of peace, population is the most serious one and is not given sufficient prominence in the World Conservation Strategy. All the problems of a deteriorating planet are aggravated by the fact that the number of people on the planet keeps increasing even in countries where the birth rate has decreased drastically.

Incidentally, the time in years required for the population to double is given by the simple formula: 70 divided by the percentage rate of growth. If the percentage growth is 2%, for example, 70 divided by 2 gives 35 years which is the world average doubling time for population growth. But there are countries, like Mexico for example, where the percentage increase is greater than 2 and for which the population doubling time is, consequently, less than 35 years.

Environmental education should work closely with national and international organizations, like the International Planned Parenthood Organization, whose concern is to slow down the expansion of the world's population. An environmental ethic should stress the need for considering the damaging effect which a burgeoning human population has upon the biosphere.

2. The Peace and Armaments Issues

Sustainable development is impossible in a state of war and extremely difficult if sizable expenditures are utilized for armaments in time of peace. War and preparations for war tend to be exorbitantly wasteful in terms of natural and human resources. Preparations for nuclear war on earth or in space devour resources at prohibitive rates. So the issues of war and peace, armament and disarmament and violent or nonviolent approaches to the solution of political problems all impinge upon environmental education and should be taken into account (10).

3. The Role of Science in Environmental Education

The new science which is basic for a consideration of environmental problems is ecology (11). As an academic discipline it is usually treated at the university level. But ecological principles should be considered in designing environmental education activities at all levels, both in and out of school. Ecology is an eclectic science which draws upon the other basic sciences of physics, chemistry, biology and the sciences of earth and space.

I believe that environmental education must be solidly based on the facts and approaches of science. It will, I believe, benefit from a stronger infusion of the processes and products of science.

We need to continue training research scientists but I believe that even they should have a general education strongly infused with an environmental ethic so they can look at science in the light of its overall environmental impact. Integrated science courses, in particular, could benefit from the use of the environment as an integrating theme (12).

There are interesting thoughts abroad in the philosophy of science. One is an awareness that stems from the Heisenberg uncertainty principle of physics at one extreme and systems analysis at the other, that scientific investigation cannot be as purely objective as the pioneer scientists and philosophers like Newton and Descartes once thought. These new approaches support the environmental insight that man has to be considered as one of the variables in the global equation (13).

Another idea stems from the growing scientific evidence that the Earth behaves like a self-healing organism (14). This hypothesis deserves further study because it may give us both scientific and philosophical incentives to care for Mother Earth. These new ways of looking at the earth may lead us toward a feeling of respect and compassison for the earth as our habitat, and as the source of life and of our basic necessities such as food, shelter and clothing.

4. An Environmental Ethic

Although the adage "all power corrupts and absolute power corrupts absolutely" refers to political power, it contains some truth as regards the physical power which science and its partner technology have given us. With enough powerful bulldozing machines we could, for example, demolish in a relatively short time a pyramid that took many men possibly decades to build. With a nuclear blast we could vaporize it in an instant. These considerations lead us again to the need for moral restraint and ethical guidelines in environmental education.

These issues then: population, peace and armaments, science and ethics, are examples of topics in environmental education which could be elaborated further in a revised version of the existing World Conservation Strategy or be incorporated into a new world environmental education strategy.

The list is not exhaustive and the responses from members of my Commission have convinced me that there is a wealth of information and insights on environmental education which can be tapped from our network.

For example, John Baines says: "...we must have the courage to divert resources from armaments if we are to achieve peace through a safer and more caring world."

Alexander Peal reminds us that we have not addressed ourselves to the needs of the absolutely poor.

Chris Maas Geesteranus warns us that the consumption patterns of the industrialized world are wreaking havoc in the Third World.

Sophie Jakowska tells us that there are theological issues associated with the environmental ethic and that organized religion could be an ally in the implementation of an environmental education strategy.

Bartholemie Vaohita gives us the catch phrase "development without destruction" to summarize the essence of "sustainable development."

I could quote many others but I must move on.

TOWARD A WORLD ENVIRONMENTAL EDUCATION STRATEGY

Now let me quote directly from another part of the Strategy where it stresses the need for other strategies to be developed in parallel with one for conservation:

"Living resource conservation is just one of a number of conditions necessary to assure human survival and wellbeing, and a world conservation strategy is but one of a number of strategies needed: a strategy for peace; a strategy for a new international economic order; a strategy for human rights; a strategy for overcoming poverty; a world food supply strategy; a population strategy...All such strategies should be mutually reinforcing. None has much chance for success unless they are."

When I read that paragraph it occurred to me and to several other members of my Commission that an educational strategy belonged in this list. The topic was brought up in several meetings, starting in 1980, and considerable interest was generated in the creation of a world environmental education strategy, but enthusiasm for this idea died out for lack of official support from international organizations.

I think, however, the time has come to breathe new life into this old idea. If national environmental organizations like yours around the world raised the priority of this item on their agendas it would be possible to create task forces in different parts of the world to begin discussing environmental education strategies, first at the regional and local levels, and later at the international level, eventually with support from an international organization. An international conference might be convened to pool ideas from the different regions to form the basis for a global approach. If an extraordinary effort were put into its prepararation, such a confernece might be held three years from now (certainly no sooner). The least one could hope for would be that it be discussed at the meeting of the Commission on Education of IUCN at its next General Assembly meeting in 1987.

I think that discussions of a world environmental education strategy could begin by studying Section 13 of the World Conservation Strategy in which education programmes and campaigns are proposed to build support for conservaton.

Let's begin by stating that one of the principal aims of a world environmental education strategy should be to build support for conservation through environmental education activities as suggested in the World Conservation Strategy. How this is translated into action depends on environmental needs as perceived locally but visualized, if possible, within a global context.

A BANFF DECLARATION

At the end of my talk in Ontario, Craig Copland read a resolution which had been penned by John Smyth of IUCN's Commission on Education. It forms part of the tape recording of that session but it has never appeared in print. Here it is:

"Whereas the World Conservation Strategy has provided a foundation for the global improvement of our quality of life through the conservation of living resources and whereas education is a vital component in the achieving of a sustainable society, Man Environment Impact 1982 affirms its high regard for the educational objectives of the IUCN expressed through the work of its Commission on Education and urges that the highest priority be given to continuing support for worldwide conservation education as fundamental to the achievement of the aims of the World Conservation Strategy."

I suggest that the Copland/Smyth statement be studied as the basis of a Banff declaration which reinforces the need for a world environmental education strategy based upon the infusion of an environmental ethic into all of education.

Let me conclude with the following thoughts:

Man prides himself in being the only intelligent animal on the earth. Yet he is the only one that has caused such vast devastation on the biosphere (15) (16) (17) (18).

In less than a thousand years, which is the blink of an eye in geologic time, he has consumed most of the fossil fuels which took nature millions of years to produce. The air we breathe is full of noxious fumes and radioactive particles of his making.

He has placed millions of tons of concrete and cement on roads and cities where there were once forests and wildlife. At least 3000 square kilometers of prime farm land is disappearing each year under buildings and roads in developing countries alone.

Thousands of millions of tons of soil are being lost each year as a result of deforestration and poor land management.

Hundreds of millions of rural people in developing countries are forced to strip their land of vegetation in order to find wood for cooking and heat.

Each year 4000 million tons of dung and crop residues are burned for fuel which could otherwise regenerate soils.

Now man has the capability of generating a nuclear holocaust which could devastate the biosphere and make life on earth extinct.

There are those who believe that a world environmental education strategy is too grandiose a scheme. But what, short of that, is going to reverse the trends that are driving us to damage the planet even further?

I believe Man is intelligent enough to develop a world environmental education strategy which will infuse all of education with an environmental ethic so that we can move away from the destruction of species and ecosystems and lead to development without destruction, the ultimate aim of the World Conservation Strategy.

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The challenge of environmental education is in many respects the challenge of life itself, of survival and prosperity, of peace and social equity. The fact that its domain is not constrained by any boundaries of national identity, physical, cultural or political, makes each of these goals more complex in conception and inordinately more difficult to achieve. This is not to suggest, however, that environmental education has abandoned its characteristic aims to become absorbed within the whole dynamic morass of human affairs, but rather that the fundamental issues which it seeks to address and the goals to which it aspires are some of the most important concerns in the world today, and our success in achieving them will by definition have a determining influence on future patterns of world development and on the quality of human life.

What then are these fundamental goals; how should we address them; and what are the likely constraints in their achievement? Firstly, to reflect briefly on the general characteristics of environmental education as proposed in 1972 by IUCN[1] and subsequently developed and refined through the Belgrade Charter and the Tbilisi Conference in the mid-and late-1970s respectively: environmental education aims to develop, in individuals and society as a whole:

(a) an understanding of the complex and dynamic interrelationship between ourselves and our total environment;

(b) an appreciation of, concern for, and commitment to the wise and indefinitely sustainable use (conservation) of both natural and modified resources; and

(c) the ability and willingness to participate with others in solving environmental problems and thereby attempting to improve the quality of human life.

The emergence of the World Conservation Strategy in 1982 brought us one step futher in attempting to develop a functional as well as intuitively appealing philosophy of environmental education in establishing that principles of conservation and development were not necessarily incompatible. Indeed it is largely because of this Strategy, and the many National statements and strategies currently being prepared in response to it, and in other places the discussions and debates surronding it, that one of the primary goals of environmental education (which for want on a better term I shall call its "economic" goal, though it is really much more than that) can now be expressed in both meaningful and practical terms: it is to promote and seek to implement the concept of sustainable development; to reconcile the fundamental aims of conservation and development in a way which permits the utilization of natural resources within the limits of their replacement potential and with explicit consideration for their long term impact on human society and on the world in which we live. It is in this respect to expand the temporal perspective of economic and technological development, but it is not, and should not be, to subsume the basic values of environmental conservation within a more appealing and, in political terms at least, more "responsible" development strategy. There is a fundamental difference in priorities between those who seek to conserve and those who seek to develop the world's resources, and in the sacrificial cost that each is prepared to bear in fulfilling their respective goals.[2] To reconcile these different priorities is to establish a functional balance between them; a working compromise based on mutual understanding and respect but without any assumption on either part of unconditional surrender or ultimate conversion of the other.

There is a valuable lesson to be learned in this from the principle of multiculturalism which has achieved a new prominence, and in many respects a new meaning, throughout many countries of the world in recent years. It is presently defined in Australia (and presumably in compatible terms elsewhere) as the maintenance of cultural diversity within a cohesive social framework. By the latter is meant a single broad legislative structure within which different groups, self-identified by race or religion, place of origin or any of a variety of other characteristics, may coexist with equal rights of access to all forms of social support and legislative control. This at least is the ideal, and while in practice it may be undermined by human intolerance and by a variety of tensions and anxieties, both chronic and sporadic, it still provides an essential and to a large extent practicable model for social development. In the same way it is possible, I believe, to establish an effective working relationship between those whose values lean predominantly toward conservation and those concerned more for development without attempting to constrain or to ignore the inevitable spectrum of individual differences.

This leads me to the second major goal of environmental education: what I shall call its social goal. In brief it is to promote and seek to establish patterns of behaviour which are consistent with the concept of a world community within which is acknowledged a single class of humanity, heterogenous in racial origin and cultural affiliation but, within reasonable bounds, homogeneous in enjoying a similar standard of living. It is this goal which presents by far the greater potential conflict both in its interpretation and in its achievement.

Let me first consider some of the basic problems of interpretation. The term "community" normally implies a close affiliation, or at least some form of shared identity, between its members, and when we speak of particular sub-groups or factions within a community we imply that the differences which separate these groups are in some sense subordinate to those shared characteristics which define them as one community.[3] In what sense, then, can we seriously speak of a world community? At the global level we do not share a common theology, nor a common set of legal rights, nor a common educational framework, nor a common, or even comparable, style and quality of living, nor any of those things which we assume as basic elements of both national and more specific community identities, and to preserve which we are prepared to dedicate and if necessary sacrifice our lives. We are, of course, all human in the broadest biological sense, but if this is to be our only criterion for describing ourselves as members of a world community then we stretch the term beyond the limits of its normal meaning to the point of blatant hypocrisy.

World consciousness does not necessarily imply a world community, and the present Workshop theme "think globally" which has underscored much of the discussion at this conference is just as prone to concealing unmitigated self-interest as to reflecting any genuine sense of international identity. What differentiates the two are the motives we attach to consideration of global issues - the limits to which we are prepared to accept responsibility for the well-being of other people and to this end moderate our own behaviour and ambitions. We cannot, I suggest, speak seriously and with conviction about establishing the concept of a world community without acknowledging the need for personal compromise in the interest of broader social equity.

Moreover, if we accept that the principle of social equity is inherent in the meaning of world community, at least to the extent that we assume in more specific uses of the term community, then we need also to confront some further problems of implementation. Firstly, there are two characteristic emphases in environmental education--the promotion of personal experience and involvement in local community issues (this is reflected in the second part of the present conference Workshop theme, "act locally") which in their own right could be argued to undermine the more fundamental aims of global perspective and world identity in that they focus explicitly on personal interests and concerns. Identification with other people, other countries, and other cultures cannot be assumed as a natural development while these remain largely unseen and, in the normal educational process, largely alien. They must be taught, and particularly where the focus is on personal experience they must be related explicitly and contiguously to that experience if they are to be effective.[4]

The second problem is a rather more complex one and may indeed present something of a paradox in attempting to resolve the two fundamental goals of sustainable development and social equity referred to above. If we assume, for example, that the object of sustainable development can only be achieved through the development of better (in the sense of more sophisticated and more efficient) technology, and if it could be demonstrated convincingly that such development were more likely to succeed in a socio-economically elitist rather than egalitarian society, then both goals would not be jointly, or at least not concurrently, achievable. Of course the assumption of technological advancement as a prerequisite for sustainable development is itself a contentious issue and in practical terms open to abuse, and the relationship between this and social egalitarianism is as repugnantly false to some as it is self-evident to others. But it is at least conceivable that both aspects of the argument have some foundation, and it is the way of human nature that whatever foundation they have, as well as some they have not, will be exploited by those with greater economic wealth and capacity for self-advancement as a basis for maintaining, rather than sharing, this capacity.

It is not my intention here to propose an argument for social revolution, nor to deny the many excellent and successful environmental initiatives that have been taken by countries throughout the world on behalf of others as well as themselves. But I do wish to point out some inherent problems and potential contradictions in these two fundamental goals of environmental education that will have to be addressed in the coming years. How exactly they should be approached and how successfully they can be achieved or reconciled will to a large extent determine the shape of environmental education for the immediate future as well as its practical contribution to our survival and to the development and continuity of human culture.

In concluding I should like to comment briefly on some of the major themes and issues which have emerged throughout the present conference and which have not already been addressed. Firstly, the commitment and enthusiasm of those involved in environmental education at every level and in every sphere of educational influence, while encouraging in itself, does not appear to have been matched with any comparable sense of urgency and enlightenment among those responsible for funding and administering educational systems. It has been argued several times at this conference that environmental education is not so much a field of study as a way of life; a philosophy which pervades, or ought to pervade, the entire education system. But if this is so then the measure of its success is the extent to which it does infuse, explicitly or otherwise, the whole educational process, both formal and informal. In this we have achieved only limited success; our philosophy is generally tolerated and often formally acknowledged by educational authorities, but seldom is it promoted beyond that level and very rarely indeed as an essential curriculum element. It is true that we have made some valuable progress in this area against formidable forces of apathy and inertia and in circumstances dominated by more immediate problems of rising unemployment and general economic uncertainty, but we have no cause for complacency. The decision-makers have yet to be persuaded of the fundamental importance of environmental education, and we ourselves have yet to reach consensus on how exactly this philosophy should be incorporated within the mainstream of educational thought and practice.[5]

The second major issue is that of evaluation and research, which seems always to have had a disappointingly subordinate role in environmental education to that of curriculum development and to have been characterised by the somewhat superficial and haphazard techniques of afterthought rather than by any planned and, as far as is possible in research of this kind, controlled experimental design. In an area of education uniquely defined by the attitudes, values and personal behaviours which it seeks to develop, this is a matter of understandable but nonetheless serious neglect, for it opens a new and largely uncharted field of educational knowledge which may well hold the key to successful implementation of environmental education programmes but in which we have had so far to be guided simply by personal experience, intuition and prejudice.

For the first time at this conference there are signs of serious and systematic attempts to bring together the disparate strands of research on attitudinal and behavioural change relating to environmental education and to explore new paradigms aimed at providing more substantial insights into this vexed and complex field. Unfortunately, the type of answers we would like to find--the universal generalizations on human learning and behaviour--do not exist; the number of different factors involved and the complexity of their interactions do not permit such simple descriptive or empirical models to be defined. But there are valuable elements of knowledge to be gained from these approaches, albeit incrementally, and if we are ever to understand in detail the process of environmental education these research efforts must be encouraged to continue and to develop further as the necessary methodological basis is established.

In many respects this conference has provided an extremely valuable insight into the status and directions of environmental education around the world, and in some respects, too, it clearly represents the forefront of world understanding and philosophical development in this field. Without in any sense detracting from the conference environment--a setting of almost unparalleled beauty which cannot fail to arouse in each of us a feeling of exhilaration and wonder--what remains from the conference to disseminate to others, to guide and promote the further development of environmental education, to encourage those already committed to the field and to persuade those who are not, are the insights, understandings and supportive affiliations which have been established here. In every respect it has been a bounteous harvest of experience, and one which we now have an obligation to share with others throughout the world.

NOTES:

[1] Earlier definitions had also been proposed by various individuals and organizations, the most notable being that endorsed in the U.S. Environmental Education Act of 1970 (subsequently repealed in 1980); but the IUCN definition was probably the first to provide both a detailed and comprehensive statement of the basic and essential characteristics.

[2] It is interesting to note here the definition proposed by William Safire of an "environmentalist" as "an anti-pollutionary; one who puts the values of the preservation of the earth and its atmosphere ahead of economic development." (Safire's Political Dictionary, Random House; New York, N.Y., 1978, p. 204). While any such dichotomy is bound to be simplistic this does provide a reasonable indication of relative priorities in the spectrum of conservation and development values.

[3] We sometimes speak also of a community within a community, for example of native, Aboriginal, or particular immigrant communities within a broader Nation or State, but when we speak of such specific groups as members of the larger community we tend also to subordinate their differentiating characteristics to those shared by all members of the larger group.

[4] Similar difficulties in identification have been found, for example, in attempting to establish or discern positive attitudes toward conservation of wilderness areas among students living in metropolitan areas who have never experienced such an environment, or to the protection of wildlife species which they have never seen.

[5] The widespread support already shown at this Conference for the development of some form of World Environmental Education Strategy appears to reflect, at least in part, the need for a more unified international approach to environmental education and to its principal concerns and possible implementation strategies.

1.F. Sacks, Arthur B., "NAEE President's Address", President of NAEE, Acting Director, Institute for Environmental Studies, University of Wisconsin-Madison, 1007 WARF Building, Madison, WI 53705.

Comrades et amis, Pour nous, l'association d'education environnale de l'Amerique Nord, c'etait un grand plaisir d'avoir notre premiere conference ici a Lac Louise; de recevoir l'hospitalite tres gentille de la province d'Alberta et du governement du Canada; et de disceter nos interets partages au sujet de l'education environnale.

Colleagues and friends, It has been a great pleasure to hold our first conference as the North American Association for Environmental Education here at Lake Louise, to receive the splendid hospitality of the province of Alberta and the Government of Canada, and to pursue our common interests in environmental education.

As my attempt at French indicates, changing the name of this association from one based on notions of political sovereignty to one based upon regional and geographic environmental realities is more than a matter of nomenclature. And it means more than simply holding our annual conference in Canada, or Mexico, or other parts of North America on a prescribed basis. It also means that we must recognize the growing diversity of our growing membership--the language differences, the cultural differences, the political differences, and the broad range of new needs and requirements these differences reflect. The North American Association for Environmental Education will attempt to respond to these differences by incorporating greater participation by Canadians and others in North America in NAEE's governing structure. And we will establish a special committee to examine the totality of the implications of changing our name. This special committee will be asked to offer recommendations for changes in NAEE policy, procedures, and structure that may be needed. Our commitment to these goals is real.

The new venture we have embarked upon here in Lake Louise, however, emphasizes commonalities as well as differences--our shared interdisciplinary mode of intellectual inquiry; our shared concern for the fate of our only one earth; our shared pedagogical perspective; and, as both the Honorable F.D. Bradley and the Honorable John Frazer so eloquently stated, our shared need to approach environmental problems that are transnational and global in orientation as they are local.

We in the various nations of the region have much to learn from each other as we continue to develop rational and meaningful responses to the vast complexity of problems, questions, and issues facing our environment. We have much to learn from each other as we meet our responsibilities as environmental educators to educate the general public; to educate environmental managers; and to educate and continue to educate ourselves--the present and future environmental education community.

The new direction of NAEE reflects the awareness by environmental educators that perhaps we have focused too narrowly upon our own backyards, our local problems of pollution and resource depletion, resource consumption and the broad array of factors that influence human activity at local levels. The local perspective is critical. It is critical for citizen involvement, it is critical for problem-solving, and it is critical because individuals can most forcefully affect change at local levels. But, we must also instill in our multiple audiences the certainty that as individuals, as consumers, and as waste producers, we are also global citizens, and what we do as individuals in local communities is part of a larger picture--that the individual decisions we make, those our communities make, those our governments make, are not merely discrete acts without connections to other discrete acts in communities, in nations, in large geographic regions, and in our world. Unless we can provide this sense of connection in space and time, over the long haul, we will not have completed our objectives or met our responsibilities as environmental educators.

And we must be able to provide this sense with a surety and an intellectual rigor in our substance, our content--platitudes are inadequate for educators. Rigor requires that as educators we must remain current--remain active in our fields and our profession--contributing new ideas and perspectives based upon our experience, our thought, and our research. The requirements of our jobs and our personal lives in a world so often filled with doubt, uncertainty, and overwhelming complexity, is often an intimidating reality. Opportunities to come together to explore new ideas and approaches, opportunities like those afforded by our annual conference help us to keep current and sharp--and contacts with our peers and our friends resuscitate us so we can continue our efforts when the conference ends and we return to real life. We need our peers to evaluate our thinking critically--to assess, in essence, whether we are handwaving, whether we are mouthing empty phrases, or whether, in fact, we know what we are talking about, what we are, and what we expect to be as professionals.

This particular conference has made this clear, it has renewed us, helped us set new directions. It has also shown us that professional standards are required of professionals. The success of this conference has been due to the tremendous personal effort of Bill Stapp and the team he put together, especially Dorothy Cox, Martha Monroe, Joy Finlay, Susie Washington, Giovanna Dichiro, Jerry Berberet, Joan Heidelberg, and many others in support groups from across Canada and the United States.

Join me in applauding their foresight and their 36 months of planning and energy. And join me in thanking the province of Alberta and the Government of Canada in their tremendous support and cooperation to make this first international NAEE Conference a memorable one.

This conference is a culmination, and NAEE has come a long way since its first conference in 1972. We have more definition with a clearly articulated mission statement. We have a structure which equitably incorporates and fosters the interests of our diverse membership. We have expanded that membership and services to them. And we have recognized our responsibility as a professional society within an international and global context.

It is a good beginning, but it is only a beginning. As an Association we must continue with energy and vigor to further build NAEE membership and membership services, to continue to develop a coherent and substantive program for our members based upon their interests, needs and concerns. We will attempt to do just this in the year ahead. We want to hear from you--we want to invite your participation, your ideas, and your suggestions.

But we must do more than build our own organization. We must further the field of environmental education, sharpen its goals, offer leadership in developing ideas, in getting beyond the obvious, in deepening our understanding and conveying the best information currently available to our publics. This requires professional commitment and imagination. The talent and energy is here within NAEE. We will seek to tap it rapaciously. We need your help.

Next year, our conference will take place 28 September-4 October in Washington, D.C. We hope many of you will be able to be there. At that time perhaps my French will have improved and I will have had reason to learn Spanish as well. Thank you.

II. THE BANFF DECLARATION

In October, 1984, The North American Association for Environmental Education convened an international meeting on environmental education in Banff, Alberta, Canada, attended by representatives from 28 nations, including several from the developing world. The Conference was international not only in its participants, but also in the global nature of its concerns.

Twelve years after the United Nations Conference on the Human Environment held in Stockholm in 1972, it is evident that the overall quality of life for vast numbers of people is now worse than it was, and that the state of the global environment continues to deteriorate.

Therefore, we, as environmental educators, affirm that the current educational approaches and the back-to-basics movement in education will fail to meet the needs of humanity unless we begin at once to address the serious environmental concerns that presently face every member of the world community. The new basic education must endow learners with environmental competencies that will enable them to contribute to the resolution of local and global problems and to the development of an ecologically sustainable society. Such competencies will need to be supported by a new environmental ethic that embraces the whole of the natural order with which human societies must live in harmony for survival. This movement must achieve no less than an infusion of the new environmental ethic into every aspect of the educational process.

In light of this, we, the participants of the Banff Conference, call for an unprecedented effort to educators throughout the world to restructure their entire educational programs, to meet effectively the urgent needs of humanity and of the planet.

Approved October 8, 1984, by participants at the annual Conference of the North American Association for Environmental Education, Lake Louise, Canada.

III. Berberet, William G., "Environmental Education for the Biosphere: Workshops on Ecologically Sustainable Development," Dean, College of Liberal Arts, Willamette University, Salem, Oregon 97301, USA, and Sacks, Arthur B., Acting Director, Institute for Environmental Studies, University of Wisconsin-Madison, 1007 WARF Building, Madison, WI 53705.

Environmental educators and scholars, and a scattering of other environmental professionals and students from ten countries and five continents participated in a workshop to evaluate educational strategies for ecologically sustainable development. The workshop involved intensive small group assessment of ecological and cultural imperatives which contribute to patterns of environmental exploitation as an economic resource. Insights gained from the analysis of economic, political, social, and ecological factors in development formed the content for educational approaches and methods the workshop generated to improve the ability of both formal and citizen education to respond to crucial issues of biosphere survival.

Sponsored by the Environmental Studies, K-12 Education and Non-Formal Education Sections of the North American Association for Environmental Education (NAEE), the workshop inaugurated the annual Conference of NAEE which met for the first time in Canada. The purpose and structure of the workshop was modeled after the International Workshop on Development and Biosphere Stability, held in New Delhi, India, June 1-5, 1984. The one-hundred participants from ten nations at the workshop in India focused upon patterns and impacts of development in the developing Third World; the Lake Louise gathering emphasized the economic development-environmental protection interface in the more highly industrialized North American context. Both workshops related their respective regional analyses to the biogeochemical well being of the biosphere as a whole and the notion of protecting habitats as physical, biological, and cultural ecosystems.

The New Delhi workshop, cosponsored by the Indian Environmental Society, the India Department of the Environment, India Ministry of Education, the World Council for the Biosphere, and the International Society for Environmental Education, concluded that problems of deforestation, desertification, soil erosion, and salinization of soils are environmental problems first and foremost because they threaten the ability of developing countries to feed themselves. Facing high rates of population growth and low per capita income, Third World nations place higher priority upon economic development than environmental quality. Alarmed by the increasing magnitude of environmental problems, however, especially those caused by population pressures, concern is growing that effective environmental management must accompany economic advances.

In addition to the recognition that steps are necessary to maintain the very existence of the environment as an economic resource, the New Delhi discussions revealed anxiety about the impact of economic development upon traditional cultural values and mores.

Some saw the environmental movement as a way to shore up cherished elements of culture which transcend material aspects of human well being. The call was heard that developing countries should "reindustrialize" and "remodernize" in ways that avoid the disruption of values, family structure, and community which have accompanied industrialization in the West. Maintenance of cultural diversity was seen as comparable in importance to the notion of ecological diversity. Preservation of traditional cultures which have sustained environments for millenia and values which stress conservation and a land ethic were especially emphasized.

Environmental education was seen as a vehicle to promote a balance whereby standards of living could be upgraded in a way compatible with imperatives of environment and culture. Workshop participants recommended establishment of a national environmental education center in India to provide research, teacher training, and direction to the Indian EE movement. Educational efforts were seen as especially needed to reach into rural areas and to influence decisionmakers in government, business, and industry. In order to have biosphere-wide impact the workshop recommended that a global environmental education network be established to foster research, share information, and improve communications on environmental matters.

The theme of the Lake Louise Workshop, "Education for the Biosphere: Thinking Globally, Acting Locally," invited participants to devise educational strategies that would move environmental education beyond the classroom to the large community. In fact, the Workshop inspired an activist mood which carried over in the NAEE Conference and resulted in approval of the so-called "Banff Declaration," a call for a renewed environmental education movement on a global scale due to the decline in quality of life "for vast numbers of people" and continued deterioration of the global environment since the UN Stockholm Conference in 1972. The Banff Declaration noted that environmental education must be inserted at the center of the so-called "Back to Basics" movement in education in order to "endow learners with environmental competencies that will enable them to contribute to the resolution of local and global problems and to the development of an ecologically sustainable society." Further, the Declaration proposed the evolution of a new environmental ethic embracing "the whole of the natural order" and "every aspect" of education.

Workshop participants adopted a series of recommendations to address resolution of local to global environmental problems more effectively. Specifically, the group recommended development of a "Global Environmental Education Strategy" and establishment of a "World Environmental Education Fund" to support realization of the new environmental ethic also called for in the Banff Declaration. The workshop also urged creation of a global environmental information network and widespread dissemination of advanced information technology. Finally, the workshop urged increased efforts to develop environmental education programs in the major sectors of society beyond the schools.

Although the New Delhi and Lake Louise workshops were structured similarly, differences in setting and backgrounds of participants presaged several contrasting outcomes. The Lake Louise workshop attempted to use the setting of Banff National Park as a case study of a conscious attempt to limit development in systematically planned ways. Although the Lake Louise gathering took pains to consider development regionally and globally as well, the context of this workshop contrasted starkly with New Delhi's urban setting and the pressures upon the land everywhere in evidence in India. Contextually, the two workshops represented almost the extremes of priority upon econonmic development and environmental preservation which exist within the global environmental education community.

The professional backgrounds of participants in each workshop varied significantly, even though ten nations and several continents were represented in each. Most of the New Delhi participants were research scientists and social scientists or environmental officials from India. They tended to analyze ecological and cultural imperatives in detail and were largely inexperienced in developing effective educational strategies to communicate this knowledge in classroom and community. The Banff group, on the other hand, largely consisted of professional environmental educators from the highly developed West, notably Canada, Australia and the United States. The Lake Louise participants had mixed success in evaluating and relating ecological and cultural imperatives in depth, but were systematic and comprehensive in articulating the "Global Environmental Education Strategy."

Keynote speakers reviewed the New Delhi Workshop, described the Banff and other park planning and management processes, and introduced discussions of ecological, cultural and educational imperatives. Workshop Co-Director, Arthur Sacks, NAEE President-elect, outlined major conclusions and recommendations of the New Delhi gathering. Sacks' remarks underscored the critical contributions of the humanities to environmental education in providing analysis and interpretation of the culture-environment relationship. Alan Schwartz of St. Lawrence University presented a case study of the planning and execution of the 1980 Winter Olympics at Lake Placid, an elaborate development undertaking in the midst of northern New York's Adirondack Park. This project, relevant to the Workshop because of the proximity of the 1988 Olympics to Banff Park, illustrated ways in which environmental and economic interests can be served through a systematic management process.

Valerius Geist of the University of Calgary, John Baldwin of the University of Oregon, and William Stapp, NAEE President, from the University of Michigan, delivered keynote addresses prior to the small group sessions on ecological, cultural, and educational imperatives, respectively, in sustaining development. Geist emphasized the necessity to maintain the regenerative and, therefore, productive capacity of soils, to preserve protected natural areas as the "seed stock" for ecological recovery of damaged lands, and to control toxic pollution of food chains, a hazard which may be reaching crisis proportions in some of the most highly industrialized parts of the world.

Baldwin stressed lifestyle implications of the emerging post industrial society in the West. Citing such works as Naisbitt's Megatrends and Toffler's The Third Wave, he suggested that the arrival of the "Information Age" raises possibilities of reduced energy consumption, resource utilization, and pollution output per unit of production as the "smokestack" industries are replaced with computers and robotics. At the same time, decentralizing tendencies accompanying this "information revolution" may create new environmental problems as populations move away from urban areas to settle in and around high quality, often unprotected, natural areas.

Stapp outlined a comprehensive and systematic strategy for environmental education, truly a systems approach which would enable the educational process to mirror interdependent, interacting characteristics of the human ecosystem. His analysis related the formal and nonformal dimensions of education, the public and private sectors of society, the producer and consumer elements of the economy, the decisionmakers and general citizenry of the state, the rural and urban portions of the landscape, and the natural and built environments. Stapp emphasized the roles of holistic thinking, effective communication and individual empowerment as necessary techniques to provide environmental education with the organization and momentum to grow in influence.

For the more than one-hundred participants, the highlight of the workshop was the brainstorming process on the imperatives in nine small groups, each mirroring the international, gender and professional characteristics of the workshop as a whole. General reporting sessions captured some of the richness of the small group sessions, but were unable to communicate effectively the subtle elements of discourse and the intense fellowship which occurred. Although few new insights about ecological and cultural imperatives emerged, the focus and content of conclusions and recommendations regarding environmental education were gratifying, especially in the integration of ecology and culture in the educational strategy.

IV.A. Allen, Irma A., "Environmental Education: Impact on Three Aspects of Development in Africa," P.O. Box 135, Mbabane, Swaziland.

Developing countries in Africa are exciting, dynamic places, with great diversity yet sharing certain aspirations. Among these is a strong desire to establish an individual identity, to provide basic education and primary health care for all, to improve the general quality of life, to become self-sufficient in food production, and to develop a thriving economic infrastructure.

At the same time, there are some common constraints to development shared by most developing countries. One of the greatest is the very high population growth rate. On an average, the population in Africa is expected to double between 1980 and 2000. This type of rapid population growth places great pressure on resources, such as land, water, forests. Another constraint is that most of the developing countries are still burdened with vestiges of what may be referred to as "colonialism." For example, systems such as those of administration and education were established under colonial rule, and these have now become the habitual systems, but do not necessarily best meet country needs. Lack of trained manpower is another serious problem which hampers development.

In efforts being made to eliminate or reduce the effects of these constraints, I have observed certain areas where environmental education is making a great and significant impact. I will share some of these with you by referring to three completely different environmental education projects in three different developing countries in Africa.

Environmental Education for Survival

For the Rendille people in northern Kenya, environmental education may be a question of life and death.

For centuries, the nomadic Rendille people had been subsisting entirely off their herds of camels and goats, moving over large areas in search of forage and water. When bad droughts occurred, livestock died in large numbers. Those that survived were usually shared. Nevertheless, some people starved, too. It was a life of great hardship, but still the people adapted and lived in balance with their ecosystem. However, in recent times, development has resulted in the introduction of things such as a few permanent boreholes, some schools, clinics, and even famine relief. Ironically, this development has had harmful effects. It has caused people to become increasingly sedentarized, resulting in ever growing circles of overgrazed, denuded land around their "manyattas" (camps). The fragile ecosystem cannot support their altered lifestyle, and the Rendille's existence is threatened by desertification.

Since 1976, UNESCO has been carrying out one of its major Man and the Biosphere (MAB) projects, associated with desert encroachment and ecological degradation of arid lands, in a 23,000 sq. km. study area in northern Kenya occupied primarily by the Rendille. A team of scientists has been conducting ecological research on the rangeland, woodland, livestock human migrations water resources, climate, etc., and building up an excellent picture of the environment, its problems, and possible solutions. Land use and livestock management plans for the area were developed. At that point, then, the challenge was how to reach and motivate the pastoralists to adopt a modification of their practices.

A pilot project was designed to test the efficacy of radio as a suitable medium to communicate with pastoralists, and to see whether a specially designed series of radio programs could be used for environmental education purposes.

Radios were placed in twenty manyattas (nomadic camps), and field assistants were trained to operate the radios, lead discussions after each program, and fill in evaluation sheets.

The radio programs were developed and broadcast for a period of six months. The topics chosen were based on the Rendille's main concerns: camels, trees, water, goats, security, etc. Each program would begin with a local person voicing a particular concern or question. This was then linked to IPAL's research, to make the point that the research was aimed at helping to solve the people's problems. Practical results of the research on that topic were then disseminated.

Although the logistical constraints were tremendous, the pilot project was a big success. A pre-radio program survey and a post-radio program survey were conducted, and the findings showed marked gains in desired knowledge and attitudes.

Environmental Education for Relevance of Formal Education

In Zimbabwe, since 1979, all primary schools offer an Environmental Science and Agriculture Course in Grades 1-7. This is the result of an Environmental Education Research Curriculum Development Project.

The Project began with a needs assessment study. Education officers, inspectors, headmasters, teachers, parents and resource people all made valuable inputs to the content and structure of the new course. In an initial questionaire, the respondents were asked to describe one concept or main idea they would like to include in a course of environmental studies and why. The responses were tremendous. Here is an example: "Children should be taught about the importance of trees, and how to plant them." Why? "Because in our area, we are very short of trees, and people have to walk far for firewood."

After the curriculum was developed, teachers assisted with field testing and with determining the most appropriate level for various activities. The end result of this cooperative effort was an integrated program with provision for the development of capabilities to enable primary school children to be aware of and concerned about their environment, and to interact effectively and to mutual benefit with it. This curriculum takes into consideration factors such as individual needs, national needs, teachers' capabilities, the nature of primary education in the country, available facilities and other resources. It is relevant and meaningful.

Environmental Education for Cultural Integration

With development, come many new and sometimes foreign ideas, opportunities, responsibilities and expectations. Every developing country faces the challenge of reconciling traditional beliefs and practices with these "modern" ideologies.

In Swaziland, an interesting applied research project is taking place. It is aimed at bridging the gap between the powerful group of traditional healers and the modern doctors and health workers.

During the last few years, the Ministry of Health, with financial support from the Agency for International Development (USAID), has been building up an information base through research into traditional and modern health care. Green and Makhubu (1984) have specifically investigated the possibility of cooperation between the traditional and modern health sectors.

The picture which has emerged from this research shows that there appears to be some very sound reasons why action should be taken towards improved cooperation.

1. Roughly 85% of the population consults traditional healers at one time or another;
2. There are roughly over 5,000 traditional healers (tinyanga) operating very lucrative practices. This constitutes a healer/population ratio of 1:110 as compared to a medical doctor/population ratio of 1:10,000;
3. Traditional healers are interested in cooperation with the modern health sector, in training in modern health care techniques, and in a Healer's Association which has government support;
4. There are areas of traditional medicine where a common ground for cooperation exists, and there are some traditional practices which are harmful, and where some form of intervention is needed;
5. There are certain "modern" illnesses (e.g., Cholera) which the traditional healers feel they cannot treat; and
6. In order to provide basic health care for all the population by the year 2000, all available manpower must be harnessed to achieve this goal.

After some exploratory meetings, a pilot project to exchange views and to train healers was approved. Its purpose was to demonstrate that the training of traditional healers should increase cooperation between the traditional and modern health sectors and improve the treatment and prevention of diseases common in children.

The first pilot workshop was held in June, 1984, and attended by 5 clinic nurses, 25 traditional healers, and some outside observers. Concrete recommendations were made, and training took place.

Since that initial workshop, district workshops have been held, with participation from healers who attended the first workshop. It is estimated that about 4,000 healers have joined the Healers Association, and that 2/3 of the healers from the first workshop have built, or are in the process of building, latrines at their homesteads.

Some of the hoped for goals are:

1. Standardizing of remedies and treatments.
2. Minimizing harmful practices through education.
3. Cooperation in promoting prevention of disease through basic sanitation, hygiene, nutrition education.
4. Self monitoring by healers to discourage unsafe practices.

If these goals are achieved, the impact on the improvement of health conditions, especially in the rural areas, will be great.

Although these 3 case studies are quite different, the one thing in common is that at the heart of each, is an environmental problem. It is becoming increasingly clear that the greatest problems facing developing countries in Africa today, are environmental ones, e.g., overpopulation, deforestation, desertification. Also, these problems have arisen in fairly recent times, and are largely due to man's inability to keep pace with changes and to maintain a balance of resources. Thus, it is through environmental education, in its broadest sense, then, that man, in developing Africa, will acquire the knowledge, skills, and attitudes to make wise choices and forge ahead in well-planned development.

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IV.B. Atachia, Michael. "Environmental Education in Africa-a Review." Mauritius Institute of Education, Reduit, Mauritius.

A Preamble on the Colonial Era

Environmental Education in the African context cannot be seen separately from the process of development.

The colonial era had in many not so superficial ways, de-developed the continent through the colonial emphasis on cash crop cultivation, on service to a distant metropolis, on "deculturalization", and reorganisation of peoples, communities and frontiers on a 'non ecological basis'.

The colonial era was marked by a serious non-recognition of some of the values we today recognize as being essential to Environmental Education namely: balance between population and resources; conservation of soil; and self-sufficiency, both in terms of physical resources and socio-culturally.

The colonial era came to an official close round and about twenty years ago, with variable degrees of persistance (Zimbabwe's independance, one will recall was in 1982). Africa has now come to terms with the conservation v/s development issue. The terms of this truce may be found in the statement of World Environment Day: "Development without Destruction."

The Meaning of Development

"A process called development has become the ideal goal of all nations on this planet" (UNEP, 1979).

The author has had numerous occasions to ask and hear (or be told) the meaning attached to this concept in various African countries or instances. There is no unanimity in that this development must be done without destructing physical Africa, cultural Africa and human Africa. This may prove quite impossible in practice if some of the conceptualisations of development heard and recorded were to be adhered to.

Clearing up the meanings attached to development is thus a priority task of environmental education in Africa.

The following questions may now be asked to broaden the debate.

. How do small isolated communities share this notion of development? If so, in what way?
. Is it fair to differentiate that aim of biology education which is community (i.e. human) development, from the comparable aim of physics, mathematics and engineering education which, it is assumed, serves industrial and technological development?
. How does a community develop from what some of its individual members learn? (E. Rugumayo, 1978).
. What are the existing (desirable) inter-relationships between the various agents of development?
. What does development mean to you: more cars? more houses? more buildings? more people? more money? more leisure time? longer life?
. Does development mean increase in GNP? Modernisation?
. Do you share the view (Atchia 1979) that development is a process of stabilisation leading to sustained equilibrium rather than growth?

Environmental Education as the development of positive environmental attitude

How is attitude change to be achieved? Studies by Perkes (USA, 1973), Eyers (Australia, 1975), Richmond and Morgan (USA, UK, 1977) and Atchia (Africa 1978) have come to some very definite conclusions regarding the relationship between environmental knowledge and attitudes. These environmental conclusions, given below, could well be a suitable guide to how environmental education must be tackled: 1) a very strong relationship has been found to exist between conceptual knowledge and attitude. 2) only a very weak relationship has been found between factual knowledge and attitude. However, programmes of environmental education, aimed by definition, at development of positive environmental attitudes must be based on concepts not factual information. Furthermore the traditional attitudes to nature must be taken into consideration on the African (or Asian) context where a lot of already very positive environmental attitudes exist.

Sources for Environmental Education

The question of the sources of environmental knowledge was first studied in detail by Eyers. Several studies have since been conducted on the subject in North America and Europe. In these continents, formal schooling is thought to contribute 40% or less to the environmental education of students while 60% of the environmental knowledge and attitudes held comes from reading, talking, radio and TV.

In modern African cities, 50% to 80% of environmental knowledge could come through formal schooling: however, in rural areas, especially where there is little formal education beyond the primary level, close to 100% of environmental knowledge and practically all the environmental attitudes come from the community. Attitudes to the environment in rural areas come from first-hand experience of the environmental behaviour of teachers, elders and others in the community. The study of such traditional cultures and the environmental and scientific knowledge they possess and utilize seems to the author to be essential to the future of environmental education in Africa and elsewhere.

As far as formal schooling is concerned, Roth in the U.S.A., Concepcion-Medel in the Philippines, and Atchia in Africa have recently worked out the details of which concepts are essential for environmental education. These concepts fall under several main headings, indicated below in outline only: 1) Human ecology and population dynamics 2) Natural resources and resources management 3) Conservation and development 4) Technology, pollution and pollution control 5) Environmental health 6) Basic ecological relationships 7) Social, political and economic influences on the bio-physica-social environment 8) Town and country planning; land use. These major headings can be utilised to construct an "Environmental Studies" curriculum, provided local illustrative examples are built-in.

Catalogue of environmental problems in Africa

1) Resource deterioration: e.g. soil erosion, salinization, desertification, improverishment of the genetic resource base; reduction of good quality water resources through pollution, exhaustion of mineral and other resources.
2) Disturbance of natural biological equilibrium.
3) Chemical pollution of the environment.
4) Physical disruption caused by man's activities.
5) Social disruption caused by the erosion of traditional culture and settlement patterns through colonization and westernization. Of particular importance has been the partial loss of the high degree of social organization and community feelings that has always characterized traditional African societies.

The African school as information centre on environmental problems

Dr Magnus A.J. Cole, Njala University College, University of Serra-Leone writes that, traditionally, the school has been at the receiving end of support emanating from the central government, the local government or the community which it serves. The school in this setting makes use of information derived extra-territorially and at best, derived nationally and from the immediate society for instructional purposes in the education of the child.

Recent efforts in educational development encourage the inquiry approach at primary, secondary and college level. With this approach to learning, the learner becomes involved in finding out knowledge, developing intellectual and psychomotor skills, while at the same time acquires positive attitudes towards, problem-recognition and problem-solving. Such activities as mentioned generate useful information, which in the area of science teaching, would not have been available otherwise, since traditional science teaching had been concerned more with transmission of facts than with developing of appropriate skills and attitudes.

Surveys of indigenous technology has revealed that a large number of rural technologies commonly operated by men, women or children can be successfully integrated into the curriculum. Through this process, children learn useful daily life skills but also with the help of teachers and other adults develop new ideas and new skills.

Integrating Environmental Education into curricula

On the African scene, as elsewhere in the world, Environmental Education is perceived as a dimension to disciplines, not as a discipline. The following trades and crafts have been indentified at the outskirts of many towns; ways and means are necessary to integrate an environmental culture into them.

List of trades and crafts:

- Panel beating
- Automechanics (bush)
- Electrical Fitting and Repairs
- Heavy Equipment Repair
- Printing
- Small scale Agriculture
- Clerk, Typist, Accountant
- Manufacture of traditional crafts
- Automechanics (garage)
- Carpentry and Joinery
- Motor car electricity
- Machinist
- Fitter
- Sign writing
- Radio and T.V. Repair
- Bricklaying
- Office Machine Maintence and repair
- Plumbing
- Refrigeration
- Cutting and Tailoring
- Photography
- Agricultural Implements Mechanic
- Seller of traditional crafts

Research seems necessary to determine the best ways of effecting the integration of EE into these trades and crafts and, furthermore, looking into the integration of these trades and crafts into community development. A look at the formal curricula themselves to see to what extent improved general education will have an impact on the various piecemeal efforts, local or international, to improve quality of life.

Finally a strong recommendation must be made here to reach and educate decision makers in Africa (both politicans and professionals) about Environment and decision-making - or put in other words, to introduce ecology into the act of government.

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IV.C. Crespo Gualda, Regina Elena. "Environmental Education and Latin America." Secretaria Especial Do Meio Ambiente, Ministerio Do Interior, Brasil.

Since the 1972 Stockholm Conference on Human Environment, and the publicity given to the several studies on economic growth, institutions oriented to the preservation and improvement of the environment were created in almost all Latin American countries. Following this same tendency, the term "Environmental Education" became popular, meaning the set of initiatives oriented towards modifying the behavior of the people of those countries in relation to the environment, as a means of preserving the natural heritage and as a guarantee of nondiscontinuity of the national development process.

Of course, the maintenance of ecological processes and the vital systems is not a postponable human task, but we have to agree that, while an abstract recommendation, changing the behavior and attitude of each man through Environmental Education needs some critical approaches in those countries which are part of the so called Third World, among these, mainly the Latin American countries.

Traces of the European culture from the XVIII century, full of an illuminism, inclined to attribute to education capacities and are still strong enough in the majority of those countries, among these, the power of modifying men's behavior without taking into consideration their concrete life conditions. When transported to Environmental Education, these values are particularly alienated because they inhibit the development of a concrete and immediate view of reality; they inhibit therefore, the creation of responsible national policies. National policies can effectively contribute not only so the national development process be exempted of risk of discontinuity, but also so planet earth maintains its capacity of supporting the human beings who inhabit it.

French economist, Jean-Baptiste Say, wrote in 1983 that a farmer or leaseholder knows how to take better advantage of the land than a naturalist who administers his own farm, despite the fact that a naturalist knows more about land than a farmer. Behind this statement, is the ascertainty that the environmental goods do not exist, in view of society only as natural goods. They are subject, in our world, to a social relation - property. Therefore, this generic man to whom we refer when we speak about education in general or Environmental Education in particular, is not sufficiently generic to be monolitic. He is divided into at least two classes, those who detain power and those who do not possess power over the environmental resources. That is between those who have and those who do not have decision power to allocate environmental resources for pre-determined objectives. It may seem curious, but it is not surprising that the International Union for Nature and Natural Resources Preservation states in the document "World Strategy Towards Preservation" - the poor people of the rural zones of the world pull out and burn several million trees yearly, using them as fuel in the kitchen or as heating. The poor people, that is, those who lack property, love nature as well as the rich, however they also consider themselves as part of nature and love themselves sufficiently, at least not to commit suicide in the name of preserving a heritage which socially does not belong to them.

Parallel to this kind of devastation practiced by about 5000 millions of undernourished and 8000 millions of destituted, who total around one quarter of the world's population, we know that 2000 square kilometers of the best land for culture disappear every year to give place to buildings and roads, only in the most developed countries - which affects not only the environmental and social conditions of the undeveloped countries that have to increasingly produce food to attend this additional demand, sacrificing their natural resources and populations.

As we also know, the undeveloped countries, even those that experienced significant industrial improvements in the past few years, are all dependent upon the importation of technology and capital. Frequently, the technological practices are highly harmful to the environment and as such, are not accepted any more in their countries of origin. Because they don't have the means to utilize their own technology, the undeveloped countries lack sovereignty to implement adequate environmental preservation policies, because they don't have the fundamental decision power for the allocation of environmental resources for the productive activities.

Considerations are being made with the objective of establishing the principle that the discussion of Environmental Education can never ignore the concrete conditions adopted by the social systems within which we live. We must not minimize the fact that these social systems are industrialists and have as a fundamental asset the accumulation of capital at the expense of the depletion of nature, either under the capitalist or the socialist system. This means: Environmental Education, before anything else, is Political Education.

There are some well established trends according to which it is possible to overcome the means of inadequate use of the environment through the transfer of technology between the developed and undeveloped countries. Although there is an efficacy line, well reduced, it should also be clear that the transfer of knowledge and the transfer of technology are not the same thing. The transfer of ideas may well be something you give more or less free in the course of communication between societies in this global village, however, technology is not an idea or knowledge in general. It is the applied knowledge converted into capital. And the criterion of efficacy of capital is not the fulfillment of genuine human needs, but the power to produce more capital. Thus, those who have technology produce technology, for only they can decide the optimal conditions for their society to apply this technology.

There is no doubt that these distressing current conditions of use of the human environment can not be resolved without technological reorientation. This probably is easy in a developed country; but, in the undeveloped countries, to where the installations and technological procedures rejected by the central nations are transferred, this reversion is not done easily and based on economic considerations. They would have to develop, at their own expense, technologies to protect their environmental resources. To this end, they would have to possess internal savings for investments, the power to establish capital reserves, and transform the consumption habits already conditioned by the current standards of the developed world. This is more a political issue, that can only be solved according to political criteria in which Environmental Education can not interfere, except as Political Education, as a means of preparing individuals for the exercise of citizenship. There is more; if environmental degradation is a real situation, this education has to turn to the present citizen in his community.

Another current trend also places formal education as a privileged vehicle of Environmental Education, that which is exercized in schools and has its focus in youth. This is a performance procedure of unquestionable interest, however attention should be called to the fact that Environmental Education can not be reduced to this, without taking the risk of falling into a postponing trap, or putting off to the future decisions which are already crucial in the present.

It is in these terms that we are attempting to work with Environmental Education in Brazil. With the communities, trying to develop their capacity to influence in the defense of the environmental quality and in those aspects which are critical in each place where they are; in the training of technical staff and experts, aiming at producing a critical mass capable of technically influencing the decision power related to national development projects and to give practical application to the legal measures issued by the State; in the formal education aiming at the creation and the continuance of a social consciousness oriented towards the preservation and improvement of environment quality. We are not innovating as to the components of which we consider generally Environmental Education. Our intention is to avoid reducing it to each of these components in particular. We also are not trying to utilize Environmental Education as a means of social control when actuating together with the communities; on the contrary, despite the difficulties normally encountered in these situations, we are attempting to transmit the idea that nobody educates a community, except the community itself. This education passing unquestionably through political education, or by the practice of freedom, which is the discovery of its fundamental problems and the fight for its solution.

In relation to the training and recycling of technical staff, we count with a very important instrument, the Environmental Training Network for Latin American and the Caribbean, which is a initiative of the governments and institutions of this region and of interest in PNUMA (United Nations Environmental Program).

The Network has as its basic objective to support those national and subregional instituions through the promotion of training, investigative and informative activities and environmental material; to assure the technical cooperation among the countries of the region and the exchange of experiences of common interest, as well as to structure a program to support regional environmental training which complements the specific activities of each one of the participating countries.

Created by suggestions of the governments of the region and recognized by the Administrative Council of PNUMA, in 1979, this entity of multilateral help developed several activities in the past years, being the majority of them an attempt to establish an operational structure appropriate to its purposes, as well as the gathering of information on the effective demands of the countries involved, in terms of environmental training, besides the potential supply of the institutions involved for the exchange of knowledge, information and services. Only recently the training activities started, being the course, held in Rio de Janeiro, for the updating of technicians (belonging mainly to Brazilian institutions), one of the most important ones. This course centered in the technology and environment and attempted to formulate practical and consistent methodologies for the evaluation of development projects that have a reflection on the environment.

Notwithstanding the fact that it is a new entity, the Network presents itself as a promising initiative, being sufficient for this to consider two aspects: first, that it is organized and oriented towards the problematic of countries with similar formation and historical situations; second, that the Network is mainly a concept it aims at the participation of entities of each participating country (the Network's focal points), therefore, with the capacity to transmit experiences resulting from concrete situations and not of ideal or theoretical situations, or yet so lacking in objectivity that they become sufficiently general to include any country without explaining or serving any of them.

IV.D. Ealey, E.H.M. "Contract Research as a Component of Environmental Education." Director, Graduate School of Environmental Science, Monash University, Clayton, Victoria, Australia 3168

ABSTRACT

It has been shown feasible to use teams of supervised masters candidates from the Graduate School of Environmental Science to undertake contract research for government and industry thus giving real life training and earning over $200,000 for Monash University. The clients not only have the services of an enthusiastic hardworking team of supervised graduates, they also gain access to University facilities such as laboratories, computers and library services plus continuing links with supervising academics.

The research project is guided by a committee consisting of representatives of the Sponsor, the supervisors and a School staff member. Once the terms of reference are agreed to, there is no academic freedom allowed in the research leading to the production of the Consultant Report. This is made clear to all concerned. However, it is also made clear that the candidates have the right to produce a thesis with complete freedom, even to criticize the Sponsor if they wish. Thus, everyone gets what they want. The candidates learn two sorts of writing and gain practical multidisciplinary research training. The simple contract protects the Sponsor from premature and possibly embarrassing publication of results but nevertheless, safeguards the rights of the students to produce theses and publish without constraint.

INTRODUCTION

Monash University has been successful in negotiating a number of agreements with industry and government agencies to provide teams of "supervised graduate students." The Monash motivation for such agreements is to provide "practical training as an element of the graduate curricula." At the same time, clients have received the benefit of having the values and viewpoints of entry-level professionals and also gain useful on going links with the supervising staff of the university. This paper describes several examples of such agreements and the results achieved.

THE PROGRAM AT MONASH UNIVERSITY

The Monash Master of Environmental Science course is two years' duration of which 25% is research. Teams of candidates are "sold" at Research Assistant rates, which at present are about $9,000 for six months' research. Therefore, a four person team would cost $36,000. This fee covers all expenses of the contract and all expenses of the candidates. The surplus is used by the School for publications, additional staff, etc. This fee also covers the services of an academic supervisor for each team member and those of a staff member from the School who co-ordinates the supervisors and the students. Monash staff do not receive personal renumeration as the supervision is part of normal duties.

There are over 150 academics in the University who find themselves assisting the Graduate School by giving courses or by supervision of research. An appropriately qualified academic is appointed to supervise each graduate student and a staff member from the School co-ordinates the group research and helps edit the final report. It is difficult sometimes to ensure that supervisors stick to the contract terms of reference and guide students to produce a report which will suit the needs of the client. From the data used to produce the report, thesis topics can be identified and candidates and supervisors are assured of academic freedom in thesis writing. We guarantee not to publish anything until after the final report is in the hands of the client.

The coursework component is designed to remedy deficiencies in the original degree so that all members of a research team have a common background as well as their own degree; for example, an engineer must learn some ecology, while a biologist must learn some engineering. There is also a compulsory subject on Science and Systems Theory. However, the most important unit relating to research is Multidisciplinary Organisation managed by an outside consultant and an expert in group dynamics. Here, team management, critical path analysis, etc. are covered while a small project is completed by a strict deadline. Final teams are formed after this course is finished. Student interests, academic skills available and possible topics for contract research are taken into account. Contracts are arranged in various ways. Sometimes the School is asked to undertake a project and in other instances, a topic is identified and funding is sought by the team and the School.

EXAMPLES OF CONTRACT RESEARCH

Over 60 team projects have been successfully completed. Those on contract research have earned about a quarter million dollars for the Graduate School. This list below gives examples: Land Capability for Recreation; Forest Management and Arboreal Species; Study of Coastal Crown Lands in the Inverloch Area; Evaluation of the Hiritano Highway, Papua New Guinea; Werribee Coastline Study; McArthur River Catchment Management; Problems of Toxic Waste Disposal; Latrobe River

Study; Intrusion of Mercury in Food Chains; Agricultural Development in Tambunan, Sabah, Malaysia; Salinisation in the Samut Songkhram Province, Thailand; and West Nakani Oil Palm Scheme. P.N.G. Social, Economic and Environmental Effects.

Of these examples, three are worth mentioning in detail:

(1) Social and Economic Impact of the Hiritano Highway, Papua New Guinea

This highway had been built to link Bereina in the rich agricultural land in the Angabunga River basin, to Port Moresby, about 150 km to the east. The objective of this highway was to facilitate transport of vegetables to Port Moresby, stimulate vegetable production and thus reduce the need for imports.

The team of three visited the area for a short initial fact finding mission and then returned to Australia, where the academic supervisor and the School revised the terms of reference and set practical limits to the study. These were agreed to by two representatives of the P.N.G. government who assisted with in-country supervision.

The team assessed the success of the highway and found that for a number of reasons production and flow of vegetables from Bereina had increased very little and the cost benefit analysis on which the decision to build the highway was based was inappropriate. The team and supervisors produced Environmental Report No. 6 Socio-Economic Impact of the Hiritano Highway. The three these produced were not related to the terms of reference. Indeed, it is unlikely that the P.N.G. officials would have initially agreed to the thesis topics as two were rather controversial, i.e.:

> "The disbenefits of the Hiritano Highway" which pointed up the problems caused by sudden access between a city and a rural community such as massive inflow of beer and consequent social disruption.
>
> "Factors to be Considered to Stimulate Agricultural Production:" which emphasized that transport facilities alone would not cause increased production of vegetables, especially when the land was covered with betel nut, a very much more valuable crop.

However, the officers in the National Planning Office found the theses a very useful bonus of the contract, and one of the candidates later gained employment with the National Planning Office. All of the candidates learned a great deal about Papua, New Guinea.

(2) Aspects of the Latrobe River Ecosystem

This river is the most important in the region, being used by power stations, a paper mill, and many towns along its length. The

Australian Paper Manufacturers Limited (APM) contracted with the Graduate School to undertake a baseline study of the river and to assess the impact of the discharge from their paper mill on the river. The research team consisted of a civil engineer (hydrologist), a biologist, and a Chinese chemist from the EPA in Peking. Because the river condition is regulated under the Australian EPA State Environmental Protection Policy (SEPP), Ying Hsuan became involved in a most practical way with the working of the Australian EPA as well as with the impact of a well-regulated paper mill on a river and the methodology of water quality assessment. The team and supervisors produced:

-- Environmental Report No. 15--Aspects of the Latrobe River Ecosystem, while each candidate produced a thesis:
-- An Appraisal of the SEPP for the Waters of the Latrobe River Catchment.
-- Effects of Pulp and Paper Mill Wastewater on River Water Quality.
-- Environmental Implications of Hydrology and Water Resources Planning.

In this case the theses were more critical of the EPA policy than the paper mill.

(3) Land Use Changes and Salinisation in the Samut Songkhram Province, Thailand

This was not actually a contract as it was funded by the Australian Government. However, it is worth considering, as the process is similar and was extremely successful. Two Thais came to Australia on fellowships to undertake the Monash M. Env. Sc. with a view to them returning as staff members to the Faculty of Environmental and Resource Studies. As well as completing much of the course work component of the degree, they formed a team with two Australians. The team and a supervisor did the field work and secondary data collection during a three-month visit to Thailand. The Australians learned about research in the Third World by falling in klohngs, being bitten by dogs, and catching amoebic dysentery. The Thais were most useful as interpreters and in translating secondary data. The Australians will be most effective as officers with the Foreign Affairs Department or in private industry. All have had the experience of tackling a most complex array of interrelated land use problems, using techniques such as Landsat, I. R. photography, soil and water sampling, economic and social surveying. They also now have some understanding of the political and financial ramifications of the land use problems they assessed.

Conclusion

The research component of the Master of Environmental Science program at Monash University has been developed so that it can be used by teams of candidates to earn funds for the university and gain real-life training. The supervising member of staff from the Graduate School ensures the successful completion of all contracts and happily all have been successful so far. Financial links with Government agencies certainly makes them more interested in the School and indeed some graduates obtain employment after the client has actually seen him/her at work.

IV.E. Francis, George. "Issues of the Great Lakes: A Transnational Problem." Chair, Environmental Studies Program, University of Waterloo, 198 Westcourt Place, Waterloo, Ontario N2L 2R7 Canada

The current status of US-Canadian cooperation on Great Lakes issues will be explored through the Water Quality Agreement and through the International Joint Commission on the Great Lakes. An analysis of environmental education opportunities was highlighted.

IV.F. Greenall, Annette. "A New Beginning for Environmental Education in Australia." Director, Environmental Education, Department of Arts, Heritage, and Environment, GPO Box 1252, Canberra, ACT 2601, Australia

In 1980-81 when I last wrote about the future of environmental education in Australian schools, I was quite pessimistic and concluded that environmental education had been a phenomenon of the affluent seventies in Australia. This conclusion was based on observations, reading experience with schools, education authorities, and curriculum projects over the preceding seven years.

Environmental education aims to develop not only awareness, understanding, and skills. Most importantly, it also aims to encourage feelings of concern for the environment and its protection. This means that it is concerned with social reconstruction --environmental education programs must have moral and political components if they are to achieve the accepted aims of environmental education. In 1980-81 I argued that environmental education had been subjected to incorporation within the existing hegemony of schools in a neutralized form--the radical 'action' components of the environmental education aims had been deleted from school programs whilst the less controversial cognitive and skill aims had been retained, together with the name "environmental education." There was evidence that programs of this genre had increased during the seventies, including an increased environmental content in traditional subjects in the curriculum. In general terms there was little inducement for schools to implement all the aims of environmental education.

RELEVANT DEVELOPMENTS 1981-84

Since I published these conclusions there has been a number of developments which have made the outlook much more optimistic. Although the World Conservation Strategy was launched by the Prime Minister in March 1980, there was no immediate noticeable action on it at the national level. However, by late 1984 a National Conservation Strategy for Australia (NCSA) had been developed and endorsed by the Federal, South Australian, Victorian, and Northern Territory governments.

It is this NCSA document which gives us a new direction, focus, and hope for the future of environmental education in Australia. The document acknowledges the need for environmental education in improving the capacity of the community, professionals, technicians, and users to manage the environment and in achieving the objectives of the NCSA. In 1980 the crucial role of the World Conservation Strategy, and consequently the NCSA, in providing a new stimulus for environmental education in Australia was not clear. But it is now apparent that the NCSA is a most important document for us.

At the non-governmental level, the Australian Association for Environmental Education has grown in strength and influence. The Association is now represented on the Australian Environment Council's (AEC) Environmental Education and Information Sub-committee. The Association is also represented on the Interim Consultative Committee for the National Conservation Strategy for Australia as the sole education voice. The Association's representatives at the June 1983 NCSA conference (which developed the NCSA document) were responsible for instigating important changes to the references to environmental education in the strategy document.

The draft NCSA document which was discussed by the conference only saw a need "to develop education programs to develop awareness throughout the community...." As we all know, promoting awareness is only the first step in achieving an environmentally educated public. In recognition of the need for an "action" component to environmental education programs, the Association representatives managed to get the Conference to agree that education programs should also encourage the practice of living resource conservation for sustainable development. This expansion is a vital addition when considering the future directions of environmental education in Australia.

Indeed this acceptance of the role of education in encouraging environmental action is quite a step forward. In the past, environmental education had mainly been envisaged and implemented in terms of developing awareness and understanding, so this formal recognition and recommendation for environmental education to encourage action is most important.

The Future

The National Conservation Strategy for Australia provides a focus and framework for developing environmental education programs for schools and other audiences.

The four objectives of living resource conservation adopted for the NCSA include three identified in the World Conservation Strategy. The objectives are:

- -- to maintain essential ecological processes and life-support systems;
- -- to preserve genetic diversity;
- -- to ensure the sustainable utilisation of species and ecosystems; and
- -- to maintain and enhance environmental qualities.

These objectives give basic guidelines for developing future environmental education programs.

Within the NCSA, education and training is seen as one of the priority national actions. Specifically, the actions are to:

a. Develop and support informal education and information programs, including those conducted by voluntary and other non-government organizations, which promote throughout the community an awareness of the interrelationships between the elements of the life-support systems and which encourage the practice of living resource conservation for sustainable development.
b. Review, strengthen, and develop in schools environmental education programs which have regard for the basic objectives and principles of the NCSA.
c. Review, strengthen, and develop training, retraining, and extension programs for professionals, technicians, and users involved in planning and management of activities which impinge upon living resources, which have regard for the basic objectives and principles of the NCSA.

The endorsement of the NCSA by the federal government and the support for the NCSA in Australian Labor Party (ALP) policy all also give hope for the future. The federal government is now examining ways of implementing the strategy, such as through the national soil conservation program and national tree program, and education is accepted as a most important implementation strategy. Environmental education is recognised in the ALP Policy as a means of facilitating public participation and awareness of conservation for sustainable development. Developing appropriate programs to achieve the NCSA objectives is a task for the present and future.

Conclusion

The NCSA is a most significant document for Australia as its endorsement, or even acceptance in principle, by the Commonwealth, State, and Territory governments indicates a turning point in the prevailing attitudes to the Australian environment. To paraphase

John Fitzgerald Kennedy (1961), adopting the principles and objectives of the NCSA will mean that we will no longer be asking what our environment can do for us, instead we will be asking what we can do for our environment.

However, if Australia is to succeed in achieving living resource conservation for sustainable development there is a crucial role for education and training in developing public awareness and encouraging individual and group participation in appropriate practices. This is a large task and there is a danger that the enormity of it could prove too much.

Environmental education programs which aim to achieve the objectives of the NCSA will need to be interesting, stimulating, colourful, and appealing. They will not only be designed to develop awareness, understanding, and feelings of concern, they will also need to motivate people to act constructively _for_ the environment. This will mean a change from the fact-orientation of many current environmental education programs to an action-orientation. Facts are still an important component of the process of educating people for action, but they are not sufficient in themselves. As a recent exploratory survey of public attitudes to nature conservation by McNair Anderson concluded:

> :Our data seems to show that, given present levels of knowledge, and present attitudes, Australians only think about Nature Conservation when a specific issue arises. Once that issue fades away, so does awareness and interest.
>
> ... if a campaign stimulates interest, excitement and involvement, there is a real danger of frustration if they are not told what they can do about it."

Action is an integral part of the success of environmental education.

At the moment environmental education does not have the high profile it needs. Many people still only associate the environment with issues such as the Franklin dam or Cape Tribulation road. They don't know about "living resource conservation for sustainable development." We need to get this message or philosophy for living across to as many people as we can through formal and non-formal education programs. To do this, government and non-government organisations will need to become more political--seeking funding and publicity, representation on appropriate committees, and, most importantly, being visible as environmental educators.

All interested Australians must work together to get the NCSA message across and to get it implemented around Australia.

The National Conservation Strategy for Australia is a document we can all analyse and act upon. It is most unusual in that it was arrived at by consensus by government, industry, conservation, and other interest groups just over a year ago. It has a lot going for _it_ and it has a lot going for _us_ because it gives us a focus for developing our future programs and for seeking more attention and funding for environmental education.

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IV.G. Holmes, Roland C. "Environmental Education: A Third World Experience." Assistant Professor, Department of Geography, University of South Florida. St. Petersburg, FL 33701

Through the efforts of the Peruvian university system, a new awareness of a broad range of environmental issues is coming into focus. Some problems being addressed by these universities include increasing food production, protecting unique natural environments for present and future generations, and informing the citizenry on how best to cope with the earthquake hazard. Within this context, environmental education can play a vital role in the curriculum of Peruvian college students. Environmental education links academic learning to the community and heightens one's appreciation of the connections that exist among many of these pressing problems.

This paper sets forth the author's experience in teaching environmental education courses at the University of San Agustin in Arequipa, Peru.[1] Since environmental education should include an analysis of how people make decisions, these courses concentrated on resource management.[2] A geographic viewpoint formed the basis of this teaching. The conceptual presentation began by raising a fundamental environmental question that was analyzed from two distinctly different perspectives. Later students used four basic methods to analyze resource or environmental management situations. Finally, challenging field studies followed the theoretical discussions. As an outcome of this teaching, the university published a monograph on Arequipa's natural resources.

Field Studies

These foregoing principles were among the more difficult ones to be applied by me in two courses taught to Peruvian students in the University of San Agustin. Field studies formed an integral part of the resource management courses so that the principal objective centered on the pragmatic presentation of theoretical ideas previously discussed in class. In addition, the outings allowed students the opportunity to acquire a comprehensive view of their community.

The field exercises focused mainly on the chief economic activity of the region--irrigation agriculture. By concentrating on only the one resource activity of irrigation, the class was able to comprehend readily the basic concepts of resource management. Students learned about good and bad management practices and the causal factors determining these differences. The exercises emphasized the approaches used in studying resources, especially the analytical approach.

As background information, data collection and analysis constituted an important field operation. Specifically, students made precise measurements of the hydrologic system and mapped land uses of irrigated areas. They also drew landscape sketches to establish basic spatial relationships. Finally, students interviewed farmers and government officials concerning their water-use practices and related activities.

To give a sense of reality to the students' field work, our group held several town meetings. At these sessions officials and other villagers met the students and heard their presentations, after which a lively discussion ensued.

Students learned several things from this field experience, for instance:

- -- that gathering field information, including the making and recording of meaningful observations, is a necessary and involved undertaking;
- -- that managing resources constitutes a complex process; and
- -- that politics forms an integral part of the management of natural resources.

Conclusions

Lecturing on resource management in the Third World challenges those who come from more developed areas. While environmental ethics and pollution control are important topics in resource management, if overemphasized these subjects can easily overshadow a concern for the beneficial uses of resources for economic development. This paper has expressed a positive viewpoint about the role of resource management in environmental education. It supports the claims that field studies should be incorporated into an environmental program and that a holistic approach as expressed in geography can make an appropriate and valuable contribution in educating students who have an interest in the environment.

For a meaningful presentation of concepts in the resource management courses, the group engaged in theoretical discussions followed by field studies. As a capstone of this teaching, a joint publication was prepared. Two important and contradictory perspectives on the resource/population question were purposely presented that enabled students to better grasp the complex issues. By applying concepts of resource management in the field, and by allowing them to interact with the local population (the actual managers of resources), students developed a better grasp of the parameters under which they must function in defending the resource base. In having several members of the resource management courses participate in writing a monograph about the resources of the local area, I was able to effect a close union amongst students, Peruvian colleagues, and me. As a result of this collaboration, we hope that participants in this enterprise will be more willing to implement lessons learned. Fellow Fulbright scholars (Gullahorn and Gullahorn, n.d.) have cogently captured the essence of this experience--a message that bears repeating. The following paraphrases their idea: Unlike the stranger who comes to teach in a foreign land and is considered a person who comes today and goes tomorrow, with a bit of cultivation and much hard work, one can instead be considered a person who comes today and stays tomorrow.

Nevertheless, two points of caution are in order. First, the interested teacher should not expect too much from students or colleagues: a rule of thumb that allows one to revel in pleasant surprises when things turn out well. Second, always be ready to improvise--a condition that can range from making a base map without sophisticated instruments to unexpectedly spending the night on the open desert at near freezing temperatures because of transport problems.

University education in Peru should continue to be more community related and reflect in the classroom societal needs. This is the place where environmental education can play an important role in connecting the university to the community and where the study of resource management can contribute much to a meaningful education in the Third World. Training in resource management enables students to understand the need for proper management of resources in economic development. On the other hand, when they are encouraged to engage in field studies, students eventually will come to investigate the whole gamut of their heritage and begin to appreciate how the entire cultural and physical milieu infringes on the decision-making process in resource management. In particular, through the use of the analytical approach to the study of resources, one arrives at an understanding of a fundamental theme in environmental education: the responsive behavior we take towards the environment. Finally, as Stapp has so ably stated,

> It has become increasingly evident that there can be no hope of finding viable solutions to environmental problems unless and until education at all levels is also suitably modified to enable people from all walks of life to comprehend from childhood the fundamental interactions and inter-relationships between humans and their environment" (Stapp, 1979, p. 37).

IV.H. James, Carleton A. "Environmental Eduation and Public Awareness in the Wider Caribbean: an Overview." Consultant, Caribbean Conservation Association, Savannah Lodge, The Garrison, St. Michael, Barbados, West Indies.

This discourse is based on a project currently being executed by the United Nations Environment Programme, through the Caribbean Conservation Association, on behalf of some thirty Governments of the Wider Caribbean. For the purpose of this project and its framework, the United Nations Environment Programme (UNEP) Caribbean Action Plan, the Wider Caribbean is defined as that region comprising the insular and coastal States and Territories of the Caribbean Sea and the Gulf of Mexico, including the Bahamas, Guyana, Suriname, and the French Department of Guiana, as well as the waters of the Atlantic Ocean adjacent to those states and territories.

The framework, the Caribbean Action Plan concentrates its activities on the coastal areas, with special reference to the interactions among terrestrial, coastal and marine ecosystems, and has as its objectives:

> the assistance to governments of the region in minimizing environmental problems in the Wider Caribbean through assessment of the state of the environment, and development activities in environmental management; and
> the establishment of a framework for activities requiring regional cooperation to strengthen the capacity of the states and territories of the region for implementing sound environmental management practices, and thus, achieve the goal of development of the region on a sustainable basis.

This cooperation specifically includes:

1) Assistance to all countries of the region, recognising the special situation of the small island countries;

2) Use of the region's human, financial and natural resources through technical cooperation among developing countries (TCDC);
3) Regional self-reliance through the sharing of experience in common problems;
4) Cooperation on problems of a transnational or international nature, including natural and man-induced disasters;
5) Stimulation and coordination of international assistance activities;
6) Strengthening of existing national and subregional institutions; and
7) Increasing public interest in, and awareness of the environment/development process.

It is on this area of environmental education and public awareness, maintained as a top priority project by the governments of the Caribbean and UNEP, that I will dwell in this presentation.

Since 1974 the Caribbean Conservation Association has been involved in environmental education in the region through its programme of speakers on environmental topics in secondary schools in Barbados, and elsewhere in relation to the enrichment of the quality of life through public awareness. It was almost natural then that the CCA should have been chosen by UNEP as the implementing organisation for a project of this nature.

Implementation of The Project on Environmental Education and Public Awareness in the Wider Caribbean was begun early in 1982, almost a year after the Intergovernmental Meeting in April 1981 in Jamaica, at which its top priority status was agreed upon.

The first phase was mainly a survey of environmental education activities in the area to help determine the state as well as the status of the activity region-wide and identify existing indigenous resource materials. This activity took the form of visits by consultants to most of the countries and the use of a questionnaire (copy attached at Annex 1). In the case of countries where a visit was not possible, the questionnaires were sent to governments and non-governmental organisations and the information collated upon receipt and returned to governments for verification.

The information collected during the Survey was instructive and revealing. For example, we learned that:

1) In many countries, at the governmental level, there was a blurring of responsibility for environmental matters, consequently matters such as land use, environmental law, environmental health, energy, human settlements and marine resource management were handled by different ministries of government, without a central coordination point. This results invariably in inadequate coordination of activities.
2) At the school or institutional level, there is no subject on the curriculum entitled environmental education. Rather, environmental education appeared as a component of other

subjects such as General Science, Social Studies, Geography, etc. Curriculum developers everywhere were adamant that this approach was better than the introduction of yet another subject into already overcrowded curricula.

3) Contrary to popular belief, both in and beyond the Caribbean, there is a concern for the environment among Caribbean officials and technical personnel. The main barriers to more positive action are a paucity of information, poverty, pressure to reduce unemployment and underemployment, and the absence of any obvious and dramatic environmental mishap, the results of which could lead to massive public support for allocating a greater share of national budget allocations, enacting legislation, or enforcing legislation which already exists.
4) With one notable exception, the smaller the country the less was the emphasis on environmental education and public awareness.
5) The level of cooperation between countries of the region is severely hampered by the barriers of language, culture, and tradition, e.g. the volume and scope of information and resource materials in Jamaica to the north and Antigua and Barbuda to the south, could be tremendously enhanced by the infusion of material and the sharing of experiences from Puerto Rico which lies between them. However, because of these barriers, those countries are much more likely to initiate discussions with other English-speaking Caribbean countries, or the U.S. mainland or Canada.
6) Despite the above, there is a spontaneous willingness among technical people to exchange information, and to collaborate and a yearning for some mechanism to make this possible. This willingness as expressed during the two year survey (1982-1983) has already manifested itself in the donation of texts and audio-visual material to the Secretariat of the Caribbean Conservation Association for replication and use elsewhere in the region.
7) Unlike many groups in North America and Western Europe, the environmental non-governmental organisations in the Caribbean are not pressure groups, lobbyists, or aggressively active. Rather, they are groups of concerned citizens with common academic or social interests which provide information through publications, lectures, etc., and a persuasive approach to a realignment of attitudes at the level of the politician and the general public. Most of these organisations deal with the historical and cultural environment through National Trusts and similar activities aimed at preservation of the architectural and historical heritage.
8) The mass media are willing and eager to use environmental public awareness material, but need to have the material provided by environmentalists, governments, universities, scientists, etc.

The above are some insights into environmental education and public awareness activities in the Caribbean, obtained during the survey. The information collected in the survey is being published by UNEP in a directory which will be available in January 1985. Another product, a manual on coral reefs for schools is due to be available at about the same time.

Phase II

The Caribbean Action Plan Monitoring Committee, whose main work is follow up and evaluation of the Plan, has continued to maintain the high priority of the Project on the list of priorities of the Plan, and authorised limited funding for the next phase, January-December 1984. During this phase, the main activities were the holding of an Environmental Education Workshop for media personnel from the region in Barbados 6-8 June 1983, production of public awareness material for circulation throughout the region, and work toward the development of a network of cooperators in environmental education in the region.

The workshop was held, in view of the realisation that the public information media in the region were expected to be catalysts in almost every area of development, and yet were rarely ever exposed to the subjects they were expected to deal with, eg. economics, diplomacy, agriculture, public health, etc. It was decided, therefore, to invite nominations for participants from government and non-government media for three days of exposure to, and immersion in, matters of an environmental nature, and discussion on suitability of various approaches to environmental communication in the region. The workshop also provided the opportunity for discussion on the needs of communications personnel for the implementation of sustained programmes of environmental public awareness.

The public awareness material currently being produced consists mainly of a series of 30-minute radio documentary features entitled "The Caribbean Environment and You," which are circulated for monthly broadcast to twenty-five stations in the Caribbean subregion on topics including "Coastal Conservation, Environmental Legislation and Education, the work of the Caribbean Environmental Health Institute, and Watershed Protection." Other components include radio and television public service announcements and short newspaper articles.

The response to these products has been positive, in that the feedback from participants in the workshop was that it was a long overdue initiative which should be followed-up. The feedback from governments on the media material is that the radio programmes were regularly used and repeated, while in the case of material on video-tape, much greater use is being made of dissemination through video home systems (VHS) in small groups and service organisations, then through national television systems. This is understandable in view of the embryonic stage of national television in most of the island states and the absence of national television as in the cases of Anguilla and Guyana.

During this phase, also, the Caribbean Conservation Association has worked closely with the Division of Environmental Education of Ohio State University and the Rare Animal Relief Effort (RARE) of the United States on environmental education projects in the region, consistent with the goals of the Caribbean Action Plan.

Phase III

This project is about to enter its third phase in 1985. This is a consolidation phase with the following objectives, activities and outputs.

Objectives

Short term

1) To ensure coordination of action in connection with environmental education and public awareness activities being carried out within the Wider Caribbean, particularly by organisations outside the region, with a view to ensuring their compatiblity with the objectives of the Caribbean Action Plan.
2) To improve the conceptualisation, development and evaluation of their public awareness programmes in the countries of the region.
3) To facilitate and encourage the storage, production, and exchange of indigenous resource materials, printed, audio-visual or otherwise, in the countries of the region.
4) To promote the use of audio-visual material about the Caribbean environment from the perspective of the Caribbean peoples.

Long term

To develop an environmental ethic among the populations of the region, leading to the support of regional intergovernmental initiatives consistent with the priorities and goals of the Caribbean Action Plan.

Activities and Workplan

The Caribbean Conservation Association will:

1) function as a co-ordination point for regional environmental education activities, and as a clearinghouse for resource materials;
2) provide specific assistance to individual countries in the production of indigenous audio-visual material for their own public awareness activities and encourage the production of material for use in primary and secondary schools;

3) continue the production and circulation of public information material of regional interest, including the quarterly "Caribbean Conservation News," which will be improved;
4) develop closer links between environmental education and public awareness personnel in the English and Spanish-speaking Caribbean, through liaison with ROLAC and other intergovernmental and non-governmental organisations; and
5) will select consultants to work toward the implementation of this phase of the project.

Output and their use

1) Agreement and collaboration between the various organisations and agencies concerned with environmental education in the region.
2) Video programmes for use by community, national, regional and international media to provide concise information on the state of the Caribbean Environment, the level of awareness among Caribbean people, including decision-makers, what is being done, and how the average person can help in various efforts.
3) Improved production skills among national media, and an informal network of collaborators, the nucleus of which already exists in the form of the participants in the June 1984 CAP Workshop for media personnel held in Barbados.
4) Public information material copies of which could be made available upon request, for broadcast, reference, or research.

In conclusion, environmental education and public awareness in the Wider Caribbean is taking place at a number of levels - national and regional, sometimes with allocations from national budgets, but more often with international funding and technical assistance.

In the Spanish-speaking Caribbean, there are a number of well developed programs at the university level. In the English-speaking Caribbean, the University of the West Indies, through its School of Education, has a program of environmental education in its teacher-training activities, through its campuses in Jamaica and Barbados, and Teacher Training Colleges in the smaller islands. The French Departments of Martinique and Guadeloupe have access to and support from France in the development of this type of training.

Throughout the Wider Caribbean, public awareness activities are taking place, and being executed by individuals, groups, agencies and government departments on specific subjects. The common need, however, is for audio-visual and printed material development and exchange, and access to information as to where suitable might be available. It is envisaged that the Caribbean Conservation Association Secretariat in Barbados, will perform a clearing house function for the short term to satisfy this need. The long term plan, as agreed to by UNEP and the governments, is to establish a Regional Coordination Unit, as funds become available.

The picture then is one of hope, given an adequate level of intra-regional cooperation and collaboration. My colleagues in the project and I believe that a presentation such as this, on a project currently being executed could serve a multitude of purposes. It could serve to give regional and international environmental planners, resource managers, decision makers, researchers and public education specialists, an insight into a sensitisation process now underway in a region of the world with many different cultures, languages, and models of socio-economic development, and many small insular states, with fragile ecosystems, and severely limited carrying capacities.

Through this, it is hoped to bring to the attention of the many environmentalists here and of course their organizations, that there already exists a framework for environmental education and public awareness activities in the Wider Caribbean, approved by the governments, within which they can structure their proposals for projects in the region, thereby increasing the likelihood of these projects making a contribution to the sustainable development of the region.

IV.I. Lieberman, Gerald A. "RARE: Environmental Education Catalyst." President, RARE, Inc., 1601 Connecticut Avenue, N.W., Washington, D.C. 20009.

INTRODUCTION

There has been great progress in the protection of the Earth's natural heritage during the past twenty years. However, the lasting success of these efforts is endangered by rapidly growing populations which cause continually changing patterns of resource use in developing countries.

RARE believes that we must begin to build support for conservation through education and training, if we are to assure the long-term effectiveness of conservation programs implemented by various organizations in developing countries.

Recently, the World Wildlife Fund-US (WWF-US) recognized that the vast need and potential for conservation education and training could significantly increase the impact of its ongoing international conservation program. Thus, RARE and WWF-US decided to join efforts in this important field. RARE has since become the conservation education affiliate of WWF-US, and as such, develops and directs all international conservation education programs on their behalf.

CONSERVATION NEEDS AND GOALS OF AN EDUCATION AND TRAINING STRATEGY

Needs

In order to improve the management of natural resources through conservation education and training, RARE has undertaken programs which address three basic needs:

1) Archiving modifications in the processes of policy-making among decision-makers in both the public and private sector;
2) Changing the cultural and sociological relationship of the citizens at large to their environment; and,
3) Increasing technical capabilities and human resources in the field of natural resources management and conservation.

Goals

To be effective, we believe that conservation education must occur at all levels of society and must teach people how to live in a sustainable manner with the natural resources upon which they depend. It is critical that these efforts result in modification of day-to-day policy-making processes in both public and private sectors, and that the cultural and sociological relationships of citizens to their environment undergo dramatic change.

RARE's programs are designed to achieve the following five goals:

Goal I: To incorporate global resource management concerns into government and private sector policy-making processes.

Goal II: To improve understanding by the general public and thereby encourage support for the development of appropriate natural resources management and conservation policies.

Goal III: To develop conservation ethics in young people that will enable them to become responsible stewards of their natural resources.

Goal IV: To change patterns of consumption of natural resources on an international basis.

Goal V: To increase the technical capabilities of professionals dealing with natural resource management in developing countries.

THE PROCESS OF CONSERVATION PROGRAMMING

Keeping in mind RARE's conservation goals, education and training must guide individuals beyond a general awareness of environmental problems and should provide the technical capabilities necessary to implement effective management programs. Conservation education and training activities must deal with understanding of environmental problems and lead to the actions which eventually solve these problems.

A five step progression for resolving environmental management problems is outlined in detail below:

1) Awareness of an Environmental Problem -- Individuals or groups must be made aware of an environmental problem before they can be expected to take any action.

2) Understanding the Problem -- In addition to being aware that a problem exists, it is crucial that people understand the causes of the problem; in this way, they will be able to work toward its solution.
3) Comprehension of one's Relationship to the Problem -- Once people become aware of the problem and develop an understanding of it, they can begin to relate a specific environmental problem to their present health, well-being, and economic situation, etc., and begin to consider the type of environment which will be available for their children and grandchildren.
4) Motivation to Look for Solutions to the Problem -- People only become motivated to take action after they realize that an environmental problem and its consequences can affect their personal health and happiness.
5) Search for Solutions to the Problem -- Solutions to environmental problems range from public education to technical training activities for professionals. In some cases the implementation of these solutions is complicated and may require specialized technical assistance in addition to training.
6) Implementation of Corrective Actions -- Implementation of corrective actions requires all of the above steps. The support of decision-makers and the general public is crucial for the long-term success of any actions undertaken by technically capable natural resource managers.

HOW RARE PROJECTS IN EDUCATION AND TRAINING ARE DEVELOPED

STAGE I: IDENTIFICAITON OF GOALS

Clearly defined conservation goals provide the basis upon which decisions are to be made for the next four stages in the strategy. These goals constitute the underlying assumptive framework from which the educator approaches specific conservation problems.

STAGE II: ANALYSIS OF NEEDS

Priorities are determined through the study of a given country's status regarding each of the five education and training goals. Only an in-depth, country-specific strategy can adequately identify highest priority needs. These needs are than translated into education and training objectives and subsequently, methods.

STAGE III: AUDIENCE AND METHODS

After basic needs have been identified and priorities set, the audience is researched. Because methods must be audience specific, inadequate understanding of an audience can result in ineffective education and training programs. Generally, several methods are combined to form an education and training package.

STAGE IV: APPROACHES AND IMPLEMENTATION

Education and training objectives, knowledge of selected audiences and choices of methods constitute a program. Part of RARE's overall education training strategy involves determining how a program can best be developed and implemented in a given country. There are four basic approaches which are used depending upon the financial and technical resources available in the target country, these include: 1) RARE staff development and implementation of programs; 2) providing technical assistance to a government, private voluntary organization of individual; 3) training professionals in less developed countries (LCD's) to enable them to develop their own strategies and programs; and, 4) providing funds to groups and individuals who are pursuing activities and implementing programs compatible with RARE's conservation education and training goals.

STAGE V: EVALUATION

Evaluation of each project is used to identify problems as well as positive attributes and allow for adjustment on subsequent projects.

SUMMARY AND CONCLUSION

A number of conservation education and training programs have been identified for implementation, based upon RARE's conservation education and training goals and the previously described process. Many of these activities are parts of already on-going programs, others are new and will be implemented at the earliest possible time.

Because RARE is working to achieve long-term conservation goals, it is crucial that the international education and training programs be developed and implemented in cooperation with agencies in the "target" countries. In this way our programs produce both direct benefits for the countries involved and act as the catalyst for local activities undertaken with or without RARE's continuing assistance.

IV.J. Lien, Arne. "Environmental Education Implications of Technological Development in the Arctic." University of Trondheim, N-7084, Melmus, Norway.

(no text has been made available)

IV.K. Medina, Augusto Q. "The Caribbean Environmental Education Program." Education Specialist, RARE, Inc., 1604 Connecticut Avenue, N.W., Washington, D.C. 20009.

The idyllic picture of an island paradise in the eastern Caribbean is easily shattered for those who look beyond the gleaming hotels and white sand beaches. Deforestation, erosion, habitat loss, and solid waste disposal are just a few of the problems confronting these fragile tropical environments. At the same time, individuals with the necessary skills to increase public awareness and take action on these issues are few.

In August of 1983, the Agency for International Development (AID) gave a $125,000 grant for international environmental education to RARE, Inc., the World Wildlife Fund-US education affiliate. This grant enabled the launching in April 1984 of the Caribbean Environmental Education Program (CEEP), a good example of World Wildlife Fund-US/RARE's overall conservation education program.

CEEP addresses the shortage of conservation educators in the eastern Caribbean by training Caribbean professionals in environmental education and public awareness techniques. Unlike typical training programs in developing countries, CEEP has recruited most of its instructors from among local environmental experts who understand the region's problems. Specialists from the United States are also participating. Together, these experts are working with the trainees who are learning to design and implement environmental education programs for their countries.

CEEP is supplementing training with funds so that all participants can implement an environmental education and public awareness program in their own country. Technical assistance is also being made available to help ensure that the momentum developed during the training will not be lost when participants face the challenge of their home situation.

On the island of St. Lucia, during Phase I of the program, trainees investigated major resource management issues common to the eastern Caribbean countries. This study was reinforced by travel throughout the island to study local environmental problems. Participants saw examples of slash-and-burn agriculture, visited an oil storage installation and snorkeled on a coral reef. This gave participants first-hand knowledge of the problems and helped them develop an appreciation for the complexity of environmental issues.

Participants were also exposed to the important role that natural resource and socio-economic data play in understanding the dynamics of an issue. An exercise which investigated important natural resource issues on St. Lucia (sand mining, solid waste, and conch exploitation) gave the participants the opportunity to practice and sharpen their own data-gathering skills. A prototype environmental education program was then developed based on the data collected by the participants.

During Phase II participants returned to their countries to collect information on environmental issues of concern there. Four participants investigated fisheries related issues such as destruction of coral reefs, conch and spiny lobster overfishing, and reclamation of mangrove swamps.

Other participants researched endangered wildlife and soil erosion problems due to deforestation and agricultural practices. Participants used this information during Phase III of the program to determine appropriate programs and materials as well as design a strategy for mounting an environmental education campaign in their respective countries. In addition, Phase III, a 4 week long session, stressed training in a wide array of education and communication methods.

During Phase IV participants are in their own countries implementing the environmental education strategy they developed during Phase III. They are working to increase public awareness about the issue they selected and are seeking local support to take action on the problem. Environmental education materials to address the issue are also being developed by the participants. These materials will later be disseminated throughout the region to maximize the use of the products of this workshop.

In June 1985 participants and instructors will meet again for Phase V, the final phase of the program, to assess the effectiveness of the environmental education campaigns implemented by the participants. In addition, strategies for sustaining future education efforts in the region will be developed.

By bringing together individuals from different countries, CEEP hopes to build an environmental education network in the eastern Caribbean and stimulate increased environmental awareness and action. If successful, CEEP will serve as a model for conservation education training in other developing regions of the world.

IV.L. Metcalfe, Peter. "Environmental Science for Solomon Islands Teachers: a Pattern for Third World Countries?" Armidale College of Advanced Education, Armidale, N.S.W., Australia 2350.

General Background

The Solomon Islands is an independent country situated in the South-West pacific. There are 6 main islands, and hundreds of smaller islands. The main islands are mountainous with only limited areas of flat to undulating land. The climate is tropical and the vegetation is basically tropical rainforest with mangroves being widespread. The surrounding seas are rich in fish and there are large expanses of coral reefs and lagoons.

The flora and fauna are rich and varied, there being many endemic species. For example 44% of bird species are endemic to the Solomons and 38% are unique subspecies or races. (Diamond, 1976).

The population is approximately 250,000 with a growth rate of approximately 3.5% per annum, the highest in the Asia-Pacific region. Ninety percent of the population live in coastal villages of fewer than 100 people. In 1982 the cash gross domestic product was $400 per head (Hughes 1982). Life expectancy was 54 years and malaria was the major disease in the country.

Major exports are logs and fish which are extracted from the ecosystem. The plantation products copra and palm oil are also exported. Major imports are petroleum fuels, manufactured goods, machinery and transport equipment, and food and beverages.

For the majority of the population basic needs are met directly from the local ecosystems rather than through the cash economy. Food, housing materials, water and firewood are drawn from the nearby gardens, forests, mangroves, streams, and lagoons.

Students Background

Most students begin teacher training after three years of secondary education. Typically they under-value their own knowledge of their environment and perhaps over-value book knowledge. They have rarely been given the opportunity to develop science process skills during their schooling and these skills need to be developed. English is frequently their third language after local language and Pijin. The students therefore need practice at expressing their own ideas in spoken and written English. Since reading is not a common pastime there is also the need for reading comprehension exercises to improve their reading skills.

Methods of Curriculum Development

Discussions were held with a broad cross-section of the community including teachers and headmasters, factory managers, logging managers, community development workers, conservationists, health workers, etc. In addition, a wide range of the aquatic and terrestrial ecosystems of the Solomon Islands were investigated first hand. Published materials about the Solomons and the Pacific Region were gathered.

All discussions and field investigations were geared to answer the overall question: "What science is appropriate for the Solomon Islands?"

The topics, nominated by the Solomon Islanders as being appropriate, were arranged as shown in Diagram I to show inter-relationships between the topics.

Many activities and excursions were trialed on trainee teachers using different teaching strategies. Field activities were also undertaken with primary teachers and primary and secondary classes.

Practice teaching supervision made evident the richness of the typical school environment which make it possible to teach good environmental science despite the lack of equipment. Also, science has the potential to improve math and language lessons which are currently taught in isolation from other subjects.

The above investigations and activities led to the formulation of the series of integrated units shown in Table I. These units fit into current and proposed course patterns.

DIAGRAM I

SCIENCE TOPICS NOMINATED BY SOLOMON ISLANDERS AS BEING APPROPRIATE TO THEIR SOCIETY

Topics arranged to show interrelationships

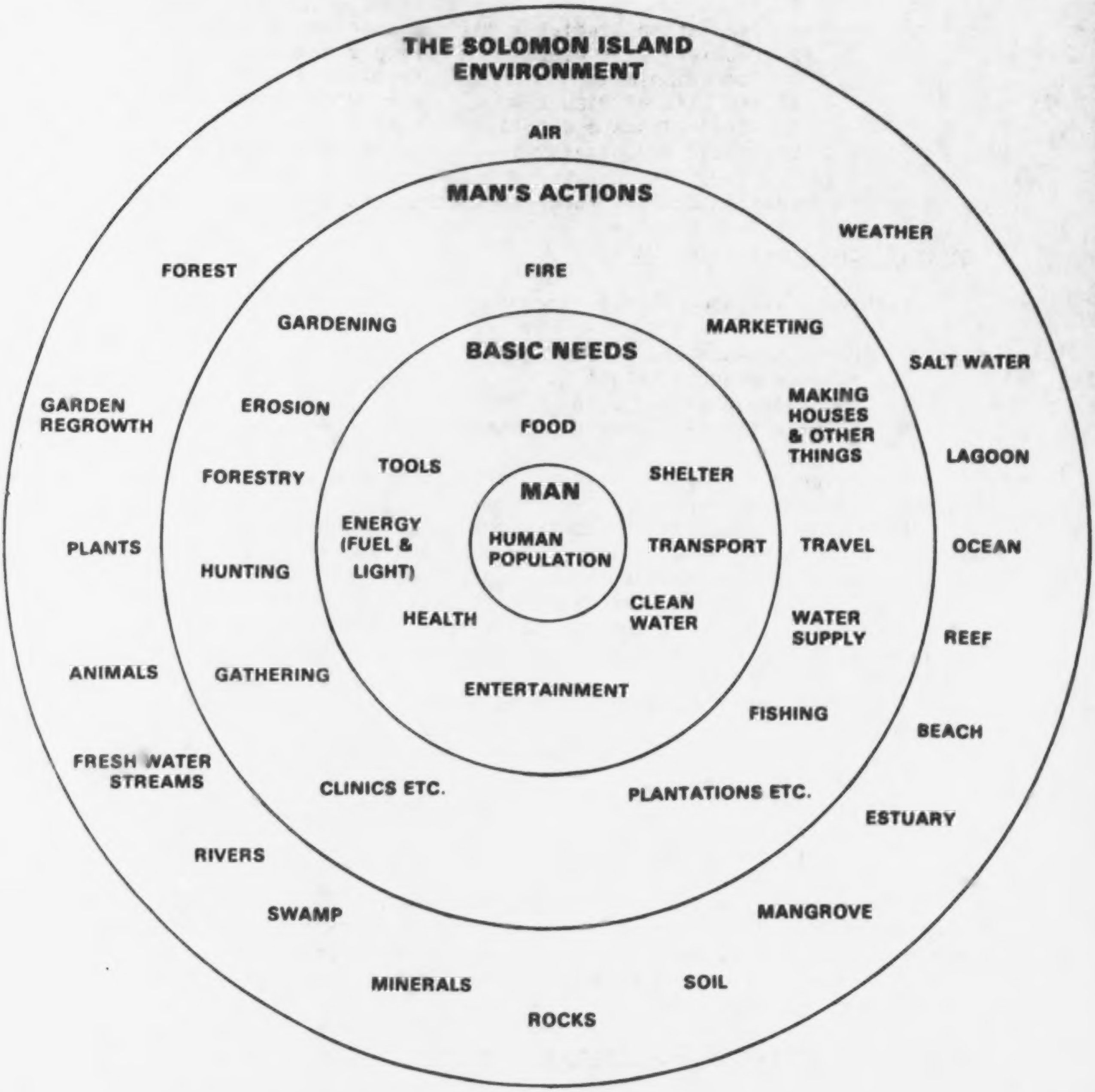
THE SOLOMON ISLAND ENVIRONMENT
AIR
WEATHER
FOREST
SALT WATER
GARDEN REGROWTH
LAGOON
PLANTS
OCEAN
REEF
ANIMALS
BEACH
FRESH WATER STREAMS
ESTUARY
RIVERS
SWAMP
MANGROVE
MINERALS
SOIL
ROCKS
MAN'S ACTIONS
FIRE
GARDENING
MARKETING
EROSION
MAKING HOUSES & OTHER THINGS
FORESTRY
HUNTING
TRAVEL
WATER SUPPLY
GATHERING
FISHING
CLINICS ETC.
PLANTATIONS ETC.
BASIC NEEDS
FOOD
TOOLS
SHELTER
ENERGY (FUEL & LIGHT)
TRANSPORT
HEALTH
CLEAN WATER
ENTERTAINMENT
MAN
HUMAN POPULATION

TABLE I Proposed Environmental Science units for Solomon Islands trainee teachers.

SEMESTER		INTEGRATED HALF SEMESTER UNITS
*1	Population Studies 1	People and Materials
*2	Population Studies 2	People and Energy
3	Common Animals	People and Water
4	The Life of Plants	Air, Wind and Weather
5	Fire, Plants and Soil	People and Forests
6	People and Mangroves	Ocean, Reef, and Beach.

* Foundation courses for both teacher and technical trainees.

General Structure of the Units

Each unit is integrated to include:

- basic science understandings
- science process skills
- basic language and math skills
- science teaching methods (semesters 3 to 6)

The balance of these components changes as the students proceed through the course.

Each unit on Population, Energy and Materials has a spiral structure which begins with the individual and the village community. National data is then studied and compared with other Pacific countries. Global aspects are dealt with last. The other units are more local in their focus but national implications are dealt with. Articles from other Pacific countries are included as reading comprehension exercises.

The units dealing with ecosystems include four broad concept areas:

- the diversity, adaptation, and interaction of plant and animals
- people's utilization of and impact on the system
- conservation and stewardship
- how to teach about the ecosystem

Since the islands differ in both ecology and local language, the students are required to individualize their assignments, using local names for the plants and animals of their particular island. However, the basic concepts developed and the teaching methods used can be applied to any ecosystem.

Alternative Units and Coordination with Other Subjects

Alternative units are necessary to allow for the changes in expertise and interests of the lecturing staff allocated to teach the course. For example, units on "People and Shelter," "People and Transport," and "People and Tools and Machines" could be substituted. Similarly, with cooperation from the Social Science department, a unit entitled "People and Industry" could be developed. "Land Use and Land Tenure" would be another suitable Environmental/Social Science unit.

The recent amalgamation of the separate departments of Environmental Science, Home Economics, Agriculture and Health, and Physical Education should ensure coordination between topics. For example "People and Forests" should interlock with the agriculture topic "Subsistence Farming." Similarly "People and Water" links to the health topic "Water Supply and Sanitation."

Teaching Strategies

Emphasis is placed on group activities during excursions and laboratory sessions. No lectures are given but students are encouraged to discuss their experiments and observations, producing written statements which they then record on the board to form a class summary. Most activities involve no more than simple improvised equipment and may be readily adapted to the elementary classroom. Discussion of teaching methods is woven among the activities as appropriate.

This approach is used to help students develop

- skills and confidence in oral and written language
- skills and confidence in science process skills
- confidence in their own knowledge of the environment
- positive attitudes towards working with others from different islands
- respect for the ideas of others, particularly those of women.

Evaluation and Evolution of the Course.

Subjective evaluation and modification of the units has been continuous since the work began in 1983. In some units pretests were used to identify attitudes and interests of the students and the concepts that needed development. Subsequent tests and assignments then indicated how successful the teaching strategies had been. Activities were also evaluated in terms of initial student response and how readily students later transferred the activities to the practice teaching situation. This process of evaluation and change will need to be continued as staff and course structure alter over the next few years.

Transferability of the Program.

The general model shown in diagram I should be widely applicable, but the specific elements fitted into the model should reflect the actions taken by the particular culture to obtain basic needs from the ecosystems accessable to that culture. Consequently, the titles and content of the integrated units would need to be altered.

It would also be necessary to evaluate the need for basic language and maths skills, science process skills, teaching skills and science content, so that teaching methods could be adapted to meet the needs of the students.

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IV.M. Quaye, Eric C. "Towards the Development of Environmental Literacy in a Developing Country - Ghana." Professor, Department of Botany, University of Cape Coast, Cape Coast, Ghana, Africa.

The improvement of environmental quality is the ultimate and significant goal of environmental education. More specifically, this goal is to create a concern that leads to a commitment to preserve or develop optimum environments and to improve less desirable ones. Most Third World societies are gradually becoming aware of the ultimate threat to human survival of further deterioration in man's environment. This threat comes from several interrelated problems, the major ones being: (1) the explosive increase in human population; (2) the rapid depletion of both renewable and nonrenewabe resources; and (3) an awesome increase in man's ability to pollute the environment.

In some developing countries, solutions to these problems have not made any significant impact on decreasing the rate of environmental degradation. This is a clear indication that these countries are not dealing directly with the underlying causes and long-range implications of the problems. Instead, most attention is devoted to ways of dealing with the symptons rather than the disease itself.

In Ghana, a half-hearted attempt is being made by the Government, through its agency, the Environmental Protection Council (EPC), to institute programmes to educate the masses on the consequences of decreasing the quality of the environment. The programmes take into account the existence of two systems of environmental education - a nonformal and a formal system. The nonformal system, which is the immediate focus of attention, is directed at the public at large or particular segments (target groups) of the general public. The formal system, on the other hand, is centered on teacher-student relationships through specific curricula and is, therefore, directed at people receiving formal education only.

The ultimate goal of these programmes is to create a citizenry that is environmentally literate. However, being informed may not necessarily bring about the desired change in attitude or commitment to improve environmental quality since behavioral patterns in adults are mainly directed by attitudes developed in childhood. Awareness of the youth, therefore, should be the major aim of environmental education in Ghana and other developing countries.

The poor state of the economies of developing countries is not the only drawback facing the successful implementation of environmental programmes. Equally important are the eco-social systems and the eco-politics operating in these countries. The problem of environmental literacy can therefore be improved if it is integrated into an overall national programme. This must be a "package program," which must take account of the interrelationships of socio-political, economic and technical factors in a systems approach.

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The tribal populations of the north-eastern hill region of India practice shifting agriculture, locally referred to as "Jhum." This involves slash and burn of developing forested communities followed by mixed cropping for a year or two. The land is abandoned for secondary succession in order to restore soil fertility until it is next cultivated. This intervening fallow period between the two successive croppings on the same site (Jhum cycle), which was 20-30 years long previously, has now been reduced to only 4-6 years.

Jhum cultivation varies depending upon the length of cultivation cycle. In a plot under a long cycle of 10 years or more, as many as 14 crops may be sown together simply by dibbling and harvesting at different times. The crop mixture consists of grain and seed crops like *Oryza sativa, Sesamum indicum, Zea mays, Setaria italica, Phaseolus mungo, Ricinus communis* (also used for rearing silkworms), leafy and fruit vegetables like *Hibiscus subdariffa, Hibiscus esculenta*, and a wide variety of cucurbits, and tuberous crops like *Mannihot esculenta* and *Colocasia anticorom.* The successive harvests of crops not only create additional space for the remaining crops but also improve soil fertility as a result of decay of left over plant debris. In the second year of cropping following the burn, *Sesamum indicum, Mannihot esculenta* and banana along with vegetable crops are preferred to the cereals. Under short cycles of 4-6 years, crops like *Sesamum indicum*, banana and vegetable crops are emphasized rather than cereals which give poor yields under these situations (Ramakrishnan *et al*. 1981). An important feature of such a traditional agricultural system pertains to mixed cropping which is apparently an efficient way of utilizing rapidly dwindling resources by choosing mutually compatible crops. Furthermore, this agricultural system involves neither any sort of land preparation nor any fertilizer input. In view of the socio-economic problems of the region, the tribals perhaps try for all their essential needs at one time, and independently, probably because of poor inter-communication.

Ecological analysis of vegetation development following slash and burn may form a rational basis for evaluating the impact of shifting agriculture on structure and function of hill ecosystems, and subsequently, for arriving at a precise management policy ensuring the quality of environment. Such an approach becomes also relevant because early successional species act as weeds owing to their direct interference with the planted crops. We present here our findings on the ecological analysis of shifting agriculture, emphasizing over the weed problem and the related environmental issues.

The pattern of vegetation development following the burn was found to be influenced by the length of the cultivation cycle (Saxena & Ramakrishnan, 1984a). Under the short cycles of 4-6 years, where the disturbance of fire is more frequent, early succession conformed closely to the "initial floristic composition model" of Egler (1954). In contrast, the classical "relay floristics model" was found to operate under long cycles of 10-20 years with a comparatively low frequency of fire disturbance. Such a difference in the pattern of vegetation development under short and long cycles may be expected because under the former situation of highly perturbed communities, "initial floristic composition model" tends to be more successful (Cornell & Slatyer, 1977).

When short Jhum cycles of 4-6 years are repeatedly imposed over a site as is the case at present, succession gets "arrested" at an early stage when the community is exclusively composed of exotic herbaceous weeds having high reproductive potential (R-Strategists). In contrast, under long cycles of 10-20 years, these weedy species are eventually replaced because of stress conditions by bamboos (Saxena & Ramakrishnan 1984b) and shade tolerant herbaceous species with low reproductive potential (S-strategists) which dominate here (Saxena & Ramakrishnan 1982a,b). This change results in the burn being more intense due to heavier fuel load under long cycles compared to that under shorter cycles. A high reproductive potential of the early successional species and consequently a high propagule production during the intervening fallow period coupled with a low intensity burn may account for a high weed population under short cycles compared to long cycles of 10-20 years. The success and apparent co-existence of the weeds following the burn may be associated with their divergent patterns of resource allocation, reproductive and growth strategies, and differential nutrient uptake and use associated with C_3/C_4 photosynthetic pathways (Saxena & Ramakrishnan, 1984c). Drastic alterations in the micro-environment caused by these exotic weeds has resulted in a rapid depletion of germplasm. Many of the orchid species of _Vanda_, _Dendrobium_ _and_ _Cymbidium_ are in the list of endangered plants.

The loss of nitrogen, which is the most critical element in the terrestrial ecosystems of sub-tropical and tropical climates (as is the case here), is due to rapid nitrification and intense rainfall on the steep slopes with sparse crop cover under short cycles compared to the longer cycles. Moreover, shorter cycles of 4-6 years do not permit adequate recovery in soil fertility, whereas long intervening fallow periods available under 10-20 year cycles can restore the soils' fertility to a large extent (Toky & Ramakrishnan, 1981).

Thus Jhum cultivation could be sustained provided the cultivation cycle is long enough, permitting the adequate recovery in soil fertility and also avoiding any invasion of noxious weeds. The repeated slash-burn of a site at short intervals deteriorates the environment in terms of both soil fertility and vegetation cover. The monetary yield gets reduced to nearly half under a 5 year cycle as compared with a 10 year cycle (Toky & Ramakrishnan, 1981). This is obvious due to serious weed and soil fertility problems associated with shortening the cultivation cycle. The extent of damage to the ecosystem could be better exemplified by an extreme case of Jhum at short cycles at Cherrapunji, which is one of the areas receiving highest rainfall in the world. In spite of an exceptionally high precipitation, it is surprising to observe general bareness of the landscape. However, there is a small "relict forest" and a few valleys which are protected from the human interference indicating that the climax vegetation of the area could be a rich forest cover.

Agriculture is certainly an important land management practice and it is perhaps practically impossible to eliminate Jhum from north-eastern India. It may be mentioned here that Jhum, in fact, is a part of the cultural heritage of tribals. Several festivals are celebrated with various operations of Jhum like cutting, burning and harvesting. However, this age old practice should be restricted in view of the critical geographic and climatic conditions of the area; otherwise modifications are urgently needed. In fact, repercussions of soil erosion caused by shifting agriculture on the steep slopes due to heavy monsonic rainfall appear in the form of silting of rivers and frequent floods in the plains of the sub-continent. It is suggested that the area could be better exploited for horticulture and forestry which would protect the soil from erosion and would also maintain a rich germplasm. Modern agriculture which involves large energy subsidies in the form of land preparation and fertilizer input may create more problems than it would solve. Since Jhum is a traditional agriculture adopted as a way of tribal life, intensive environmental education to the largely illiterate and highly conservative tribals is primarily needed to maintain the quality of environment in north-eastern India.

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The importance of environmental education is emphasized at the present time as one of the most effective tools to meet the different complicated problems of the environment. Such problems are getting to be a major threat to the quality of human life on earth. They are usually referred to "environmental crisis," and exist in all countries at various degrees of magnitude and complexity.

In order to present the state of environmental education in The Arab states, it is necessary to consider some relevant issues of effect on the programs of environmental education. A brief historical review of the conception of environmental education is helpful to explain the present activities, institutions and actions.

SOME ISSUES TO BE CONSIDERED:

The Arab region is a region where one finds many extremes: (1) very oil rich countries, and some of the poorest by world measures; (2) countries with unlimited resources, and others with very limited ones; (3) some over-populated countries and some under-populated ones; (4) some of the poor countries have huge amounts of resources, but untapped, others with limited resources, but well-developed; (5) some countries have generous supplies of fresh water, others are deprived of any.

Environmental problems are always the product of the previous conditions. In the oil producing countries pollutants are of a specific nature different than pollutants in agricultural countries. Desertification, although an acute problem in some countries like Sudan, does not exist in some others. Population control is a hope for over-populated countries, while rejected by under-populated ones.

Agricultural resources are well-developed in some countries to include every inch of cultivable land; in others millions of cultivable acres are negleted. In some countries where no cultivable land exists, very modern technology is used for agricultural production which does not depend on land resources.

Industrial production is developing in countries where man-power and resources are available; others with no resources and no man-power are starting industries with everything imported.

Some Arab countries have well-developed man-power with an abundance of scientists, engineers, educators, technicians, medical staff, etc.; others are striving to develop their man-power in different aspects.

It is of the utmost importance to mention that all Arab countries are governed by two major religions: Islam and Christianity. Both religions stress the importance of the environment, the interrelationship of its components, and ways and means to protect it. Religion is a very important force to guide individual behavior.

Most of the Arab countries were occupied by foreign forces for different periods of time during this century. Their systems of education were greatly influenced by the occupiers. Local environment was never the resource for education, because all phenomena, specimens, etc. were from the occupiers environment. All the Arab states are now independent, and started working together to develop their own educational systems to be based on the local and regional environments. Along with this, some countries with more developed teaching staff, like Egypt, started to help other countries who did not have enough staff. Some curricula and textbooks of the more developed countries were adopted by other Arab countries. This led to a kind of regional cooperation which is still progressing until now.

The Arab States, with much in common (religion, language, etc.), started to develop structures to strengthen their cultural unity. After The Arab League was established in 1945, one of its important departments was the cultural department responsible for activities in the areas of education, science and culture. It was felt some years later that the task was more than a department could handle. In 1970 a specialized organization was established which is The Arab League Educational, Cultural, and Scientific Organization (ALECSO). The organization in The Arab League is comparable to UNESCO in The United Nations system. The establishment of regional and sub-regional organizations made it possible for The Arab States to interchange experts, projects, and above all to plan for some regional projects in different aspects of education.

Through these organizations many problems of the region started to be identified, among which were the environmental problems. Added to this, the convening of The Stockholm Conference in 1972 aroused a world-wide concern and interest in managing environmental tasks with environmental education as one of the most effective ways to do so.

ALECSO PROGRAM OF ENVIRONMENTAL EDUCATION

In 1972 a survey of textbooks used in the Arab countries in the fields of science and social studies was conducted by the writer of this paper. It revealed that very little emphasis was placed on environmental education. In February of 1972, a meeting was held by ALECSO in Khartoum, Sudan to discuss aspects of the environment. Among the topics discussed was the topic of environmental education in The Arab States. It was recommended that ALECSO carry on a program of environmental education for the different stages of education. An extensive program was planned and carried out by ALECSO to help encourage environmental education in schools, universities, adult education and for the public through mass media. It was decided to plan for all categories at the same time.

The program of environmental education for schools included the development of a Resource Book for general education which would be a source of information treating environmental problems, a guidebook for teachers, curriculum planners, etc., and curriculum modules for each school level. The impact of this program is felt in many Arab States. Helping the teachers to build their own curriculum modules promotes their awareness and helps to plan and carry out successful environmental education activities. Some countries are now building their science curriculum with a core of environmental education.

The EE program for the tertiary level started with the development of another resource book directed to the higher institutions and universities, published through the cooperation of ALECSO-UNEP. Although this book was not so successful, many colleges are either developing EE programs for undergraduate and graduate students, or reconsidering their programs in light of the need for effective EE programs.

Realizing the importance of mass media to environmental awareness, ALECSO held training courses for newspaper writers, radio and television experts to develop their acquaintance and awareness of environmental problems. As a follow up, a monthly bulletin was published by ALECSO and distributed to all experts of mass media in the Arab States containing articles and scripts to be released to the public.

ALECSO started to initiate efforts to introduce environmental education in the programs of teacher education on both the pre-service and in-service levels. Many teacher preparation institutions in the Arab States are now offering courses in environmental sciences to prospective teachers. Concepts and methodologies are also dealt with in the professional courses and during practice teaching.

CONCLUSIONS AND RECOMMENDATIONS

All the Arab States are aware of the importance of environmental education as the most effective means to protect the environment. There are specific issues which should be considered in planning for effective programs of environmental education. Such programs are in different stages of development in the different Arab States. More emphasis is given to the programs of the pre-university education. Research is dealing with different aspects of environmental education, but more research is definitely needed in this field. More researchers are getting interested in dealing with the different problems of environmental education and the situation is improving.

To plan for effective programs of environmental education in the Arab States, the following are some recommendations: (1) Institutions responsible for leaders training in EE in the region need to cooperate in planning a strategy, develop programs of EE, and supervise the implementation of its different activities. This could be achieved through institutions, e.g. universities, mass media and professional organizations. (2) The availability of resource materials is basic for developing and implementing successful EE programs. This should be achieved through international, regional and national efforts. (3) There is shortage of evaluative materials for the assessment of effectiveness of EE programs. It is suggested to help construct different types of tests and criteria and help the experts in each country use it and interpret its results. (4) Sub-regional centers for EE should be established to help construct and prepare curriculum materials, teaching aids, and train personnel and leaders in the different areas of environmental sciences and technologies. (5) Research activities should be planned and carried out cooperatively by universities and centers in the region. Efforts should be made to train the necessary personnel for this vital aspect of environmental education.

IV.P. Simpson, Philip. "Education Prerequisites for Integrating Conservation and Development in New Zealand." Commission for the Environment, CPD House, 108 The Terrace, P.O. Box 10 241, Wellington, New Zealand.

Introduction: the challenge

An educational challenge facing the people of New Zealand (indeed, all peoples) is how to put modern ecological theories and social aspirations into practice. The challenge is both immediate and long-term: immediate because of the high demand for existing (often already depleted) resources and an existing political, social and economic order which is always a little behind prevailing needs; and long-term, because of the need for present-day youth and future generations to learn how to cope with new and unknown opportunities and restrictions.

The fundamental message of ecological understanding is that humans depend on natural ecosystems, the material and non-material benefits of which are constrained within limits imposed by natural processes. Parallel to this is the recognition of social needs to ensure adequate quality of life for each individual: for example, adequate participation in decision-making, peaceful coexistence, and equity among different elements of society, particularly in terms of race and sex. An awareness that each natural resource has different values for different people has also emerged. These rights and needs point to the fact that environmental awareness is but part of an interrelated package of issues. The great social movements of our day - for peace, for a healthy environment, for nature, for racial and sexual equality and identity - seek to change personal attitudes which over time have become enshrined in the social, political and economic policies of the day. The exciting, but radical, task of environmental education is to unravel the complex origins of these standards so that individuals become capable of and motivated towards resolving the social problems they cause. To some, the challenge calls for a "paradigm shift" in philosophy; to others, a gradual evolution of appropriate values and understanding is already under way.

The New Zealand Problem

In many respects New Zealand is a country with a high standard of living and high environmental quality. Yet, there are many problems. Modern New Zealand society has inherited a legacy of colonialism which involved deep dislocation of the indigenous Maori people in terms of land, language and values. The narrow vision of colonial resource exploitation has been passed on so that some resources have become depleted, and a pattern of nonsustainable use gets repeated. Contributing to the need for special care in managing resources are New Zealand's small size, the unstable, sensitive nature of its landscape, changeable weather, endemic species incapable of adaptation, and rapid expansion of pests in the island environment. Administrative and legal structures established for early phases of New Zealand's development can be ill-adapted to deal with modern problems and aspirations, and can lack the perceptions engendered by centuries of habitation. A fractured organisational basis for managing the many aspects of the environment is particularly characteristic (OECD, 1981). The cost of servicing a high demand for resources is increased by geographical isolation, which also imposes dependence on an international economy beyond local control. New Zealand shares many of the problems of other "western" countries, but also has a number of problems uniquely its own.

Integrating Conservation and Development: what does it mean?

In broad terms the integration of conservation and development means matching the social aspirations of New Zealanders with the ecological realities of our resource base. More specifically, this includes identifying the principles on which resource use should be based. To a considerable extent these principles are based on scientific - especially ecological - understanding, applied to human needs. The needs are both material and non-material, and the resources both living (renewable) and non-living (non-renewable).

The approach is a superb example of holism, one of the fundamental tenets of ecological science. In this connection it is instructive to consider the history of ecology, so ably reviewed by di Castri (1981). Understanding this history (both on a global scale, and in its particular expression in New Zealand [Simpson, 1983]) should become a specific aim of environmental education in New Zealand. A detailed consideration of the underlying principles is the means by which the issues, gaps in understanding and necessary priority actions can be identified. A national environmental education strategy is one of these action requirements.

New Zealand Conservation Strategy Principles

The task of identifying the components of an environmental education strategy has been greatly assisted by identification of the conservation strategy principles. They identify not only the broad content of an appropriate education strategy, including who should be educated, but also some of the ethical considerations essential to education. For example, the explicit view that conservation and development are integrated parts of a whole that operate in concert rather than opposition is, in itself, a paradigm shift in awareness.

The New Zealand Strategy recognizes five principles, stated simply as the:

1. protection of ecosystems and ecological processes
2. preservation of genetic diversity
3. sustainable use of living resources
4. wise use of non-renewable resources, including a transition to renewable resources where possible
5. protecion of natural resources for non-material needs (Nature Conservation Council Technical Committee, 1981)

Each of these principles contains some elements which are broad, even global, in scale, and other elements which are specific to New Zealand. Of particular significance to New Zealand is Principle 5 - protection for non-material needs - because attention is hereby drawn towards the unity between environmental and other social concerns, and the significance of personal values and personal skills - such as problem clarification and values clarification - in resolving these concerns.

Environmental Education Strategy

In order to facilitate the principles of the Conservation Strategy specific aims, target audiences and programmes for each audience need to be identified. One possible set of aims for New Zealand is as follows:

1. To foster the development of an environmental ethic appropriate to New Zealand. This includes such aspects as sensitivity to the non-human aspects of environment and to Maori and pakeha (western) values, developing a sense of place and heritage, awareness of the need for stewardship, and learning assertive personal behaviour.
2. To develop an understanding of environmental issues and the ability to resolve them. This involves a knowledge of ecology (particularly nature/culture inter-relationships), New Zealand resources and history. It involves developing skills appropriate to values clarification, problem-solving, decision-making and understanding the future.
3. To motivate a desire to act to resolve environmental issues. This involves developing a working knowledge of how decisions are made, and how to influence them through appropriate actions.

The triad, ethic - understanding - action, serves as a model which could be applied to any specific element of an environmental education course; for example, to an environmental issue such as the sustainable use of fisheries.

Target Audiences

Not all elements of society need environmental education of the same kind, or to the same degree. For instance, there already exists an extremely well developed public environmental lobby which has been largely responsible for the progress that has already been made in awareness and advancement in legislation and management. Specific target audiences include:

1. Existing decision-makers whose decisions affect environmentally sensitive areas. These include policy-makers (politicians, staff of government departments, local bodies and private companies) and resource managers (such as farmers, fishermen, contractors and their advisors).
2. Youth, both in and out of school.
3. The general public, as parents (especially mothers), consumers and voters.

Priorities for Target Audiences

This is a very large area for investigation which cannot be fully developed here. One priority, identified by a conprehensive New Zealand research programme (Scott, 1983), is formal education in schools. Scott reaches the following conclusions:

1. There is excellent opportunity within school curriculum for infusing environmental education without new and specific subjects. Science and geography are particularly well developed, although there is a need to deal more explicitly with environmental issues.
2. The two greatest shortcomings are in values clarification and motivation of action to help resolve environmental problems.
3. Teacher training is inadequate for dealing with value-laden issues.
4. Teaching recources, in the form of issues-specific lesson plans which deal with values, are inadequate.

There is little doubt that these same limitations apply to training and education for all target audiences.

Conclusion

The main conclusion is to be drawn concerning the education prerequisites for integrating conservation and development in New Zealand is that the main area needing attention lies in personal development: how to deal with underlying ethical considerations, understanding the complex origins of environmental issues, feeling competent to resolve conflict, being able to identify appropriate actions and motivate a personal desire to be involved in resolving problems. My central thesis is that these areas can be approached rationally using known skills. The educational challenge is to personalise, and ultimately societize, the considerable scientific and social knowledge which exists in New Zealand culture. The prospects are very exciting, but things will not happen sufficiently fast by themselves. The single greatest need is the training of teachers.

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IV.Q. Slocombe, D. Scott. "International Environmental Campaigns-Case Studies and Discussion." School of Community and Regional Planning, The University of British Columbia, 6333 Memorial Rd., Vancouver, B.C., Canada, V6T 1W5

The objective of this paper is to present a framework for comparing and discussing environmental campaigns, to apply this framework to five international environmental campaigns of the last century, and to draw some conclusions therefrom for the conduct of environmental campaigns, such as the World Campaign for the Biosphere (Anon., 1982; Davis, 1983). Finally comment is made on the relative importance of substance and process, education and activism, in such campaigns.

The Framework

One needs, first of all, to identify the campaign one is referring to. A short descriptive title, the campaigns dates, its initiators and their main location are recommended for this purpose.

Then one wants to consider the campaigns preparation - its problem definition, its rationale for intervention, its preparatory process, and its goals. Also to be considered is the campaigns implementation - its form, scope, level of operation, actors, resources, methods, and mandate. Finally one needs to evaluate the campaign - in terms of its effects, its adaptiveness and its follow-up efforts.

The Case-Studies

Five international environmental campaigns have been chosen as case-studies. Each is summarized here in a paragraph and the main references for each given.

1. The Plumage Trade

Bird feathers first became fashionable on hats about 1875; they dominated millinery styles after 1880. Many species from all over the world were utilized but especially hard-hit were gulls, terns, herons egrets and ibises from the New World. In London the Society for the Preservation of Birds (SPB) was founded in 1889, in the United States the American Ornithologist's Union (AOU) became involved in the issue in 1884, while the Audobon Society was founded in 1886 (re-organized in 1896). All were primarily concerned with stopping the millinery trade. The U.S. Lacey Act was passed in 1900, and by 1905, 33 states had passed complementary legislation on the plumage trade. In 1913 the U.S. Federal Tariff Act, with plumage trade prohibitions, was passed. In England the U.K. Board of Trade passed an importation of plumage regulation in 1917 and, finally, in 1921 a Bill on the Importation of Plumage was passed (Doughty, 1975, Welker, 1955)

2. Operation Tiger

Although the decline of tiger populations had been noticed as long ago as 1940 it wasn't until the late 1960's that serious attempts were made to assess and remedy the problem. Considerable "behind the scenes" work by Guy Mountfort in Europe and Asia led to the launching of "Operation Tiger" by the World Wildlife Fund (WWF) in September,

1972. In 18 months L800,000 (U.S. $1.7 million) was raised through an extensive and innovative public campaign. Soon the International Union for Conservation of Nature (IUCN) was conducting scientific research on the species and India (and later other countries) were setting aside reserves for the tiger. By 1980 over 40 nature reserves in 10 countries had been established and the tigers' population was estimated at about 6400 individuals of six races (up from 5000 in 1970). (Mountfort, 1981).

3. The Club of Rome

The Club of Rome was the brainchild of Aurelio Peccei in the mid 1960's. He joined with Alexander King to organize its founding meeting in Rome in April, 1968. There a handful of people agreed to continue, and to found the Club of Rome; a "non-organization" of selected individuals

> concerned with the well-being of mankind as a whole,... future-oriented in its thinking...and...necessarily [taking] into account the incongruities of the human condition, its values and goals, both actual and desirable, if the species is to survive. (Peccei and King, 1977).

After two years of globe-trotting and meetings the Club's series of reports on "The Predicament of Mankind" was begun. Today, as Alexander King succeeds Aurelio Peccei as the Club's president, its structure and emphasis appear to be changing (Horgan 1984) - not too surprizingly in view of some earlier soul-searching (Lazslo, 1977; Carlson, 1977; Peccei, 1977).

4. The Northwest Atlantic Seal Fishery

Sealing in the northwest Atlantic (mainly for harp seals) has been taking place since the early 18th century. Production peaked in the 2nd quarter of the 19th, and again in the 20th century. The hunt was first brought to public attention by a 1964 Canadian Broadcasting Corporation (CBC) documentary. Soon thereafter Brian Davies, later to found the International Fund for Animal Welfare, became involved on the side of the seals; in 1976 Greenpeace appeared on the scene. From the beginning there was strong foreign media, conservation group, and public interest in the subject - and stopping the hunt. 1977 was the year of the protests, Brigitte Bardot's visit, and Paul Watson's debacle on the ice. In 1978 France banned the import of sealskins from the hunt. By early 1983 several other EEC countries had also banned such imports and in October 1983 an EEC directive was issued banning imports of harp and hooded seal pup products. In June 1984 the Canadian Federal Minister of Fisheries appointed a Royal Commission to look into all aspects of Canada's sealing fishery (Bonner, 1982; Coish, 1979; Holt and Lavigne, 1982; miscellaneous press reports).

5. The World Conservation Strategy

Initial discussion of the need for a strategic approach to world conservation took place within IUCN as early as 1969. Plans for the actual development of a World Conservation Strategy (WCS) were initiated between IUCN, WWF and the United Nations Environmental Programme (UNEP) in 1975. Four official drafts, various intermediate drafts, each submitted to the IUCN membership and nearly 1000 scientists and other advisors, intervened before the co-ordinated launch of the WCS in 35 countries on March 5,1980. By August 1983 some 32 countries were at various stages of evolving national conservation strategies (NCS), and the potential of state or provincial conservation strategies was beginning to be explored. In November 1983 an expert workshop on NCS formulation was held in Geneva; a conference on the implementation of the WCS is being planned for Ottawa in 1986 (Talbot, 1980, IUCN Bulletin, LSupplements).

Discussion

All five of the above campaigns could be called successful, but they achieved very different forms of success by rather different routes. Some of the points to be drawn from the analysis of these campaigns follow.

Preparation and organization before launch appear to pay off in terms of faster results after launch. A campaign with a broad and/or strong base of support has similar advantages.

An easily stated problem, and clear-cut goals and objectives, greatly simplify the gaining of popular support for a cause. The greater the geographic and taxonomic scope of a problem the more difficult it is to solve the problem through a campaign (although it may be easier to raise public concern). The greater the scope of the problem the more important it is for the resulting campaign to be directed at decision-makers as well as the public and to aim for indirect (e.g. trade controls) as well as direct (e.g. nature reserves, plant closures) actions.

All these campaigns underscore the power of organizations and networks, even when started by only a single individual, to move a campaign along. All these campaigns underscore the importance of having large resources of money, people and expertise, in order to bring a campaign to a successful conclusion. And this, of course, is where an organization (and an organizer) are most useful. Correspondingly these resources need to be expended in a multi-faceted campaign that includes research, publication, publicity, education, negotiation and even confrontation.

A successful campaign will likely combine effects on the public with mandated changes, creation of new institutions with the creation of new frames of mind and thought.

The campaign must be "adaptive", ready to take advantage of unintended effects or to change tactics when necessary. And finally campaigns must engage in follow-up activities, whether that is 60 years of different activities in the case of the RSPB and Audubon Society, or the very useful information supplements published by IUCN about the WCS.

Conclusion

From the foregoing it should be clear that successful international environmental campaigns are complex, multi-faceted organizations including many different activities. They require attention to both matters of substance and of process; and to the fact that both education qua education, and activism may not only both be necessary but, in the long run, have similar results.

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An Investigation of Structures

In the last sentence of her last book 'Progress for a Small Planet' Barbara Ward described the inescapable physical interdependence between man and environment as the chief new insight of our century. Two sentences earlier she identified humanity as constituting the only insoluable problem to achieving a balanced and conserving planet, as indeed many others have done. Those sentences are quoted by Brian Johnson in his contribution to the response by the United Kingdom to the World Conservation Strategy. One might fairly regard WCS and the further constructive documents which it has stimulated as the most promising response to the problem, prepared as they have been through widespread international discussion.

To be widely successful practical remedial actions call for the modification of human behaviour on a global scale, not just of decision makers and environmental intervenors but of the general public whose lives will be altered thereby. This is primarily the task of educators, to provide people with the knowledge and understanding, skills and attitudes consistent with the new environmental ethic which achievement of WCS objectives demands. If this seems an impossible target, one can at least reflect that the environmental problems to be resolved are products of the very rapid adaptability of human behavior (in contrast to other processes of natural change) and that this same speed, if properly directed, might save the day.

Relating conservation to education has not hitherto been easy except in a few special contexts. Conservation has itself evolved fairly quickly from more restricted ideas of preservation and is still apt to be regarded as an attempt to maintain the exotic and the picturesque at the expense of measures which might relieve more obvious immediate problems of poverty and malnutrition, of unemployment and boredom. The objects of consevation also vary confusingly between different promoters - nature and natural resources, landscape quality, historic buildings, works of art, standards of living, population control are only a few of the things which different people think of when they use the word. To those especially who live and work in socially and environmentally deprived urban industrial areas it is difficult for conservation to be made both clear in its objectives and relevant.

By founding the Strategy on the most fundamental objectives - maintenance of ecological life-support systems, maintenance of genetic diversity and sustainable use of species and ecosystems for development - its authors have given conservation a meaning which underlies all the diverse interpretations. Such concepts pose severe problems for the educator, however, who can only hope to present them convincingly in terms of the familiar experience of his students.

Two other features of WCS constitute important progress in the presentation of conservation to the public. One is the recognition of human society as a part of the system to be conserved and as a result the severe human needs which so often have been treated as a separate and conflicting set of problems. For education one difficulty of this is that educators trained to handle the complex issues of ecological conservation are rarely skilled in the equally complex and vice versa. If this difficulty is to be no more than temporary, some urgent revisions are needed in the education and training of educators. The other critically important progressive feature of WCS is that it aims to be active rather than reactive, to incorproate conservation principles into planning processes rather than to struggle with rescue and rehabilitation attempts, a more familiar function until now. Educators will miss the boat if they cannot respond quickly enough to do likewise.

As a global strategy WCS necessarily deals to a great extent in generalities. For both practical conservation measures and for the educational programmes needed to sustain them it was foreseen in the strategy that the global statement would be followed by individual national strategies which would apply WCS principles to the particular conditions of individual countries. This has been done, or is in progress, in several countries. The UK launched its response in 1983, after an intensive process of discussion between many different organisations and individuals, dividing its subject matter between seven groups dealing with industry, urban, rural, marine and coastal environments, overseas environmental policy, environmental ethics and education; an overview report drew together the many ideas and recommendations from these groups and proposed in addition ten strategic ways to action. These documents offer more specific issues for treatment by educators in the UK but a wide gap still exists between these ideas and the practical needs of classroom teachers. A third tier of responses could help to fill the gap - in the UK, for example, we now have a national conservation strategy prepared by the Nature Conservancy Council and also a broadly based Welsh strategy significantly including an additional element on Welsh cultural heritage. More of these responses are needed however, specific to activity or geographical areas, and then a fourth tier of response translating them into action strategies, including in the case of education, practical projects and classroom materials, before the gap is closed.

For practical purposes conservation education must be incorporated in more broadly defined environmental education. The UK response to WCS has greatly eased this by its inclusion of the urban and industrial environment and by the emphasis it places on social and economic sustainability. By these means conservation ceases to be seen as a fringe luxury and becomes a primary objective of environmental education in any of its definitions. To carry these insights through to practitioner level, however, calls for the collaboration of representatives from many different academic disciplines and from a wide range of specialist organisations. This can be done successfully if they are given something fresh to do together. One difficulty that may have to be overcome, however, lies in the definition of education. Conservation groups, anxious for quick responses in public support, may express their educational needs by the provision of selected information in a quickly assimilable form; educators on the other hand place priority on drawing out the talents of the student for longer-term benefits. The latter focuses on the subject, the former on the object. Both approaches have their roles in the adaptation of human behaviour, and are inter-dependent, but ought not to be confused. This understood, the role of the specialist in constructiong teaching programmes is vital; in the field of study as complex, varied and far-reaching as this the dangers of promoting under-researched and over-simplistic solutions to problems are huge and expert guidance is essential.

The little working parties of practising teachers and topic specialists who should meet at the fourth tier of response to put together practical materials for classroom (or informal group) use should find that WCS documents offer as good guidance to potential subject content as any we have had: selection thereafter is guided by the other determinants. Three points are stressed, however: the need to draw in to the treatment of any issue the perceptions and skills of as many as possible of the relevant specialist interests (there are various ways of achieving this in different curricular patterns); because of the variety and complexity of the subject area the need to emphasise concepts and approaches, skills and attitudes rather than a pre-determined body of knowledge; the need to move outwards from the familiar in some form.

Course materials must be assessed, both before and after trial, against the objectives which they have been designed to attain. A general set of objectives in terms of concepts, skills and attitudes has been drawn up, but for each particular case this has to be expanded and adjusted in conformity with the set of main course determinants for each particular teaching situation. Unit modules are checked against these for variety and success. Courses may likewise be checked for coverage, for level and for achievement, and indeed the process could be extended to assess the quality of development through an entire school record.

Will the inclusion of appropriate topics in teaching programmes - if it can be achieved on a sufficient scale - meet the educational needs of WCS? Probably not: the educational chapter of WCS was neither so courageous nor so understanding as other parts, and there is a need for more radical rethinking of education and for more extensive changes than are within reach of groups of enthusiastic teachers. These concern the realignment of educational philosophy and the reconstruction of curricula to take account of a redefined relationship between man and environment; they also require much thought to be given to the environment in which education takes place, both formal and informal, and the educational consequences of many other policies seemingly unconnected. It is for these concerns that we need a World Environmental Education Strategy.

Can it all work in educational systems notorious for their inertia, and as yet showing little sign of responding convincingly to warnings of inadequacy? The changes in life-style implied by the recommendations even of the U.K. Response, described as initially applicable "flexibly and progressively, without vast investment, revolutionary legal changes or unrealistic human responses," will need a prepared public to receive them. Other moulders of public opinion can, of course, do much, but they will be more successful if the ground has been prepared. Carried throughout the recommendations would lead to an ecologically sounder but very different world. Convincing presentation of conservation values is liable to be offset by large and impersonal administrations, paternalistically operating relatively inflexible programmes in monotonous surroundings, for young people who see their futures affording little opportunity to work, to think for themselves or to do anything but conform to a limited life-style, or explode ineffectively in rebellion against it. Progress in education will necessarily be part of a wider progressive change in the system which it serves, and will reflect its values even when striving to shape them for the future.

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Within the last twenty years interest in the Aboriginal past has been nutured by the archaeological discoveries around the continent of Australia, particularly now that many young Australian trained archaeologists are working in the field. At the same time a renaissance of Aboriginal Culture has occurred, as the Australian Aborigines have shown a renewed pride in their heritage. Interpretation of their past by Aboriginal people has been based on their lore rather than on the archaeological discoveries. In fact, there has been some distancing by them, almost as though they are reluctant to accept the evidence unearthed by non-Aboriginals. However, both points of view can be accepted to establish the very long occupation of the Australian continent by the Australian Aborigines.

Being a hunter-gatherer, the traditional Australian Aborigine knew his flora and fauna intimately. The seasonal changes were a familiar part of his/her knowledge. The location and range of the wildlife and natural products were exploited in their daily quest for sustenance. They respected each others rights and property. An intricate system of tribal rules, based on the wealth of their lore, had evolved over many generations. The land, and its natural products, were respected because they relied on them for their survival and because they were all linked with their beliefs and their past.

The Australian Aborigines were not wasteful of the bounty provided by nature. When harvesting this produce they were mindful of the future generations. In this way a conservation ethic was practised. It has been claimed that the Aborigines have had an effect on the natural vegetation by their use of fire. Bushfires in Australia are a natural feature, with the plants and animals very much adapted to their occurrence. "Fire-stick farming" was practised by the Aborigines to encourage the plants to regenerate and wildlife to breed. Because they depended on, and used natural products, the Australian Aborigine had a comparatively minimal impact on the natural environment. This provides us with a most valid comparative study between their methods and the profligate use of the natural resources by the present-day Australian.

A historical perspective can be projected into an environmental education, beginning with the pre-contact period, protraying the traditional lifestyle of the Australian Aborigines. With the advent of the European contact 200 years ago, the traditional culture of the Australian Aborigines was affected to an increasing extent as settlement spread throughout the continent. An alien approach to the land was introduced, which entailed large-scale clearing of the vegetation and slaughter of the wildlife that the Australian Aborigines had harvested on a sustained basis for many generations. Naturally, the traditional way of life was modified as the indigenous people tried to cope with the changed circumstances of disturbed habitat and loss of free range. Other effects were direct persecution by the invaders and introduced diseases.

With few exceptions the newcomers' attitudes towards the original inhabitants was an extension of their desire to exploit the natural resources of this "land of promise". Any impediment to their exploitation was regarded as a nuisance at the least, and at worst, a pest or vermin which had to be subjugated or exterminated. The media have reflected this attitude right to the present generation. In the recent past a change of attitude in general community feeling has been developing. Current publications are presenting a more balanced viewpoint of the indigenous people and their place in modern and past society.

Educational systems in various states of Australia are addressing the problem of bias and prejudice that has been the norm for so long. In New South Wales the Department of Education has recently introduced a policy on Aborigine Education where teachers are urged to incorporate An Aboriginal Prespective into their programs or Aboriginal Studies. These are aimed at raising the awareness and an appreciation of the Australian Aboriginal Heritage. That heritage is an integral part of the environmental education process. Without an adequate input of the Australian Aboriginal Heritage, any environmental education program is unsatisfactory.

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In a developing country like India, nearly half the population are still illiterate. Industralization, urbanization and over-population are the main causes for the different pollution problems. Among many factors which have contributed to the pollution, ignorance and poverty top the list. Two-thirds of the illness reported in our country are caused by water-borne diseases. Only one-tenth of the 540,000 villages in India have a protected water supply. Air pollution is becomming a serious problem in urban areas. As per calculation, ninety percent of industrial air emissions are confined to a small number of urban pockets. It would be easy to imagine the health hazards these localities face. Many people in developing countries still use firewood as their only source of energy. This leads to large scale deforestation. Industries freely discharge their highly corrosive and toxic chemicals into the nearby rivers and streams. Due to the seepage of these chemicals, vast tracts of adjoining land become sterile. It is very difficult to demarcate residential and non-residential areas in cities because of the noise produced by industries, road transport, community activities, etc. The pollution is mainly a human problem and therefore people should be made aware of the hazards they have to face. Environmental education in different forms at all levels in simpler and regional language is the first and foremost step in saving the environment from further deterioration. After analyzing the problems of environment in developing countries, a syllabus of environmental studies suitable for people at all levels has been suggested and was discussed.

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The European Community is generally associated with trade and economic policies. The Community's environmental policy is less widely known, despite the fact that it is now entering its second decade. The European Community was in fact among the first international organizations to respond to the United Nations Conference on the Human Environment in Stockholm in 1972 when a plea was made for global action on the environmental crisis. Concern for the environment, however, is not something new in the European Community. It goes back, in fact, as far as 1957, to the Treaty of Rome and could be said to be an essential part of the fundamental philosophy which brought the Community into being. At the Treaty of Rome the Member States declared that economic growth was not their only objective; they were also concerned with the standard and quality of living of all their people. Keeping the balance between economic expansion and the quality of life was emphasised again at a summit conference of the European Community in Paris in 1972. This meeting was to act as the forerunner to the Community's subsequent Action Programme for the Environment. In calling for such a programme the leaders of the Community declared: "It should result in the improvement in the quality of life as well as in standards of living. As befits the genius of Europe, particular attention should be given to intangible values and to protecting the environment so that progress may really be put at the service of mankind." (Commission of the European Communities, 1976 page 7).

It was in this way that the Community's Action Programme for the Environment came into being. It was first formally adopted by the Council of Ministers on 22 November 1973 and was later renewed and supplemented in 1977 and 1983. Underlying the programme it is possible to detect two major principles. The first is that man's relationship to the planet and its resources should be characterised by husbandry and good management rather than by unthinking exploitation. Environmental policy is therefore not a gloss added to production and consumption but an effort both to understand and respect the planet which sustains us and to develop a right relationship to it. In times of recession and shortage it is all the more necessary to do this since the short-term wisdom of profit-and-loss does not itself ensure the best use of resources to meet social needs.

The second principle is that environmental policy should be designed to increase human welfare by improving living and working conditions. Thus while it is important to be concerned with reducing the negative consequences of production, consumption and urbanisation, and with preventative measures to safeguard the future, the ultimate concern should be to create the best conditions in which individuals, families, groups and whole societies can flourish.

Educational Implications of Action Programme

Although the Community's Action Programme for the Environment is not chiefly concerned with specific educational measures, it does have an overall educational significance. A basic assumption underlying the entire Programme is that concern for the environment is the duty of everyone in the Community and that public opinion should therefore be educated to be more aware of the fact. This point was emphasised in the first chapter of the original Programme: "This means that at all levels continuous and detailed educational activity should take place so that every person in the Community becomes aware of the problem and fully assumes his responsibilities towards the generations to come". (Commission of European Communities, 1977, page 5).

The second version of the Action Programme which was adopted in 1977 contained a more specific educational recommendation - one that was to assume increasing importance in the years that followed. The intention was announced of launching a network of pilot schools across Europe to exchange ideas and experiences in environmental education, and to disseminate these ideas to a wider audience. This plan had been under consideration for the previous three years in the Community's executive - the Commission of the European Communities. Before launching it, however, the Commission decided to test its acceptability by undertaking a feasibility study.

Feasibility Study

The need for the feasibility study primarily arose from the ambiguity that surrounded the term 'environmental education' in the member states of the European Community. There was considerable diversity between and within the various national educational systems in the way in which the objectives and content of environmental education were defined, and the way in which it was organised whether as an integrated component of the curriculum in its own right on, or as a number of separate components within traditional subject disciplines.

The purpose of the feasibility study was envisaged as being twofold. The first element would be largely descriptive in that examples of outstanding practice at upper primary and lower secondary levels (age group 9/14 years) would be selected from all the members states and presented as case studies. The second element of the study would be concerned with the acceptability of the network idea. A range of contacts would be made with key people working in the field of environmental education in the member states; and guidelines put forward for future network activities, such as establishing links between schools in different countries, animating exchange programmes and study visits for teachers and pupils, and producing resource materials in environmental education, both for direct use by pupils, and as background information for teachers. In this context the study was envisaged as a preparatory phase in the establishment of the network itself.

A report on the feasibility study was presented to the Commission in April 1976 (Trant, 1978). The report noted that it was difficult to define in precise terms environmental education in the member states of the European Community; it was not a subject like history or mathematics but was more like an ideal or general aspiration. Nevertheless there were certain similarities in the efforts of the different member states to develop patterns of environmental education. Within the age group 9/14 years the following common trends were identified: a realisation at primary level that active and child-centered learning was readily realizable through a study of the environment; an effort in the lower years of secondary schooling to integrate different subjects along environmental themes; and effort to link the school with environmental facilities, such as museums, zoos, botanical gardens, etc.; a growing number of research and development projects in environmental education; a realisation of the potential for environmental education in such traditional activities as field studies and outdoor pursuits; and emphasis on the role of urban studies as an essential element of environmental education; a growing awareness of the importance of voluntary organisations, clubs and action groups which offered young people an opportunity of involving themselves directly with their own environment.

One of the main purposes of the feasibility study was to establish contact with interested officials in the ministries of the member states. The report stated that in all cases there was agreement in principle to cooperate in the development of a network of schools in environmental education for the age group 9-14 years. The report added a two-fold justification for developing such a network. There was first of all the need for an interaction at Community level to help integrate an environmental dimension into the school curriculum; most of the ministry officials who were consulted were in favour of such an initiative and were awaiting an official notification of the Commission's intentions. Secondly, the proposed network would be an example of European cooperation in a practical and meaningful way. If the Community's ultimate aim was to lay the basis for a united Europe, then a joint undertaking in environmental education by all the member states would be a small but important step in that direction.

Structure of Network

After nearly three years preparation, the European Community Environmental Education Network eventually came into being in February 1977. The basic idea was simple: to enable a chosen group of pilot schools to enter into meaningful contact with each other. With this end in view, the Network was given two principal aims. The first was to enhance the quality of environmental education in the pilot schools through mutual cooperation and learning from each others' experience. The second was to collect, test and disseminate environmental education materials.

The first aim denoted the dynamic nature of the Network. It was assumed that the pilot schools would be chosen not only because they had a record of good practice in environmental education, but also because they were willing to share with and learn from schools from other parts of Europe. In this way it was hoped a rich and varied picture would emerge of how environmental education was taught in a whole range of different cultural and geographical surroundings. Furthermore, the potential for comparative studies would be exciting since the Network would include a series of contrasting environments--the urban and the rural, the coastal and the inland, the mountainous and the lowland, and the industrial and the agricultural.

The second aim had a seminal implication. The Network would exist not only for the sake of the pilot schools, but for other schools and institutions. It would have a responsibility to preach the gospel of environmental education in the highways and byways of Europe and to seek to influence not only the educational systems but the general public as well. It was primarily expected to do this through the dissemination of environmental materials. This brief, however, was to be interpreted widely; the materials could be audio-visual as well as print and the vehicles of transmission could include press, radio and television as well as the more traditional journals and hand-books.

When it came to a consideration of the term "environmental education" the Network adopted a pragmatic approach. It did not seek to define in exact terms the meaning of environmental education; that was considered to be the prerogative of each member state. The Network, however, offered a simple and practical guideline, which it was hoped would help to produce case studies of environmental education in action. Simply stated, this was that in the development of project work it was envisaged that environmental education would be interpreted broadly, as taking into account the different cultural background of the pupils and involving disciplines of both the social and natural sciences.

The responsibility of coordinating the activities of the Network was entrusted by the Commission to the Curriculum Development Unit, Dublin. The Curriculum Development Unit was established in 1972 by the City of Dublin Vocational Education Committee (CDVEC) and is managed jointly by the CDVEC, Trinity College, Dublin and the Irish Department for Education. The Coordinating Team keeps in contact with all members of the Network and facilitates the inter-communication which is necessary for the dynamic development of the project. An advisory committee, composed of officials from the Commission of the European Communities, representatives from the member states (national experts) and members of the Coordinating Team, is responsible for overseeing the progress of the Network and advising on all policy matters. The national experts also play a vital role in their own countries in supporting the activities of the pilot schools.

The Network so far has had two phases: primary and secondary. The primary phase, comprising 29 pilot schools, lasted from 1977 to 1982 and catered for pupils in the age range 9-11 years (later extended upwards in some member states to 14 years and downwards in others to 4 years). The secondary phase, which comprises 28 pilot schools and caters for the age range 14-19 years, began in 1982 and is scheduled to finish in 1986.

The Network in Action

The purpose of the Network could be summed up as an effort to develop a system of communications through which ideas about environmental education can be generated and disseminated throughout the European Community. The two basic aims emphasize this purpose and over the years a communication system has in fact been built up through translating these aims into operational objectives. The objectives have been realised through such concrete activities as school projects on agreed themes, visits between teachers and pupils, the publication of newsletters and various teacher hand-books, visits to schools by the coordinating team, and teacher seminars. These objectives were devised on the first occasion that the teachers met each other, in Dublin, in June 1977 and they remained the guidelines for all the Network's activities during the subsequent years.

The most important aspect of these objectives was the amount of personal interaction they brought about. The Network was primarily a network of people who agreed to undertake together a journey of united exploration. To do this, they had to meet each other and their meetings were the high points of the Network's history.

Future of the Network

At the beginning of the article we showed how the justification for the Network lies in the Community's Action Programme for Environment. The third edition of the Programme, which was adopted in February 1983, takes a long-term view of environmental action. Recognising that the times are hard, it nonetheless states categorically that "environmental policy is a structural policy which must be carried out without regard to the short-term fluctuations in cyclical conditions in order to prevent natural resources from being seriously despoiled and to ensure that future development potential is not sacrificed." (Commission of European Communities, 1983, page 4.) Indeed, the Action programme sees itself as contributing significantly towards a solution to the Community's major problems in the socio-economic sphere, especially in creating new jobs through the development of key industries which are either less polluting or use fewer non-renewable resources. As a recent Commission Publication expressed it: "ecology is nothing other than properly thought out long-term economics." (Commission of European Communities, 1984, page 82.)

It is in this context that the future of the Network will have to be situated. Just as the Action programme sets itself the goal of ensuring that an environmental dimension is included as an essential part in all socio-economic thinking and planning throughout the Community, so the Network should seek to give a lead in introducing environmental education as a necessary component at all levels of the educational systems of the member states. This is an ambitious aim but one that is in line with what the European Community stands for. In this regard it is appropriate to let the Comission have the last word:

"In 25 years the European Community has gone through many crises but also recorded major successes. Education policy has not escaped the controversies. In the future, far more than at present, it will be necessary to view this policy within a broader framework, against the background of the fields in which the Community pursues an active policy and from which it will receive new stimuli. In this way it will have an opportunity to be more effective at the European level." (Commission of the European Communities, 1982, page 27.)

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IV.V. Tribe, David. "The Role of the Gould League of New South Wales in Environmental Education in Australia." Deputy Principal. Mosman Primary School, Cromer, N.S.W., Australia.

The Gould League of New South Wales (NSW) is a semi-governmental body working under the auspices of the NSW Department of Education amongst teachers and pupils in schools. Through its organization, the Gould League gives schools practical assistance and support in developing environmental education. The League's history and growth make an interesting story for all environmental educators to read and reflect upon.

Historical Background

During the early years of settlement in Australia, stories of strange birds and other animals were carried by sailors to people of other lands. Occasionally, people would make a sketch of a bird or animal that they thought particularly interesting. However, no complete records were made until much later. It was not until 1839, after settlement had been made on the western shores as well as the eastern seaboard, that a careful and detailed study of the wealth of Australian wildlife was begun.

This work was undertaken by an Englishman, John Gould, and his wife Elizabeth. They arrived in Australia in 1838 and in the short space of two years, these hardy pioneers, aided by collectors and explorers, went out into wilderness bush and brought back records of new species. They made sketchings and paintings of no less than 681 different kinds of birds. When Gould arrived in Australia, the continent was scarcely more than a name but when his book on the Birds of Australia was completed in 1850, the name was so familiar that the discovery of gold immediately placed it in the forefront of the younger nations.

About 70 years later, in 1909, the Victorian Education Department established the Gould League of Bird Lovers to honour John Gould and his work. On the 22nd of October, 1910, in Wellington, NSW, two teachers, Edward Webster and Walter Finigan, whilst sitting in the shade of trees in the local school playground discussed their concern about the endangering of native bird life. They felt that something must be done. Therefore, on this day the New South Wales Gould League of Bird Lovers came into being to perpetuate the name of John Gould and to encourage teachers and pupils toward an active interest in the study of our native birds.

Within a short time this organization spread throughout New South Wales with the formation of branches in almost every school. Each branch was encouraged to carry out practical activities to preserve and protect bird species.

In 1936 the Junior Tree Wardens League was formed. This organization was similar to that of the Gould League, its role being to protect and plant trees and native plants.

In 1967 it was decided to amalgamate the two bodies and to cover a wider range of conservation issues. The new body was called the Gould League of New South Wales. The pledge was changed in keeping with its new and wider approach to education. "Earth is our home and I promise to try to keep it beautiful by learning to understand and conserve its soils, air, water, natural beauty and all its living things."

This new body now enlarged its role to one of conservation education, leading into environmental education in the early 1970s.

Its aims are:

(1) To develop an awareness of man's total dependence upon the interrelationships operating within both natural and man-made systems, and consequently the need for the maintenance of the optimum benefits for man from these systems.

(2) To develop an awareness of man's total dependence upon the resources of nature for his very survival and consequently the need for efficient management systems to optimize the long-term availability of the resources.

(3) To develop an ability for decision making and self-formulation of a code of behaviour about issues concerning environmental quality.

The Gould League's Achievements

Following its new emphasis, the Gould League of New South Wales rapidly grew into one of the foremost environmental organizations working with teachers and children in New South Wales. Its growth commenced with the formation of the Gould League Advisory Service in the early 1970s. This service was run in a voluntary capacity by a small group of Gould League Council members. This dedicated group assisted teachers with ideas in environmental education, conducted the League's first inservice courses for teachers and commenced the League's weekly televisoin segment on the environment. Soon the growing demands of teachers could not be met by this group. In 1974 the Department of Education in New South Wales seconded a teacher to the position of Gould League Education Officer. The first education officer, Frank Haddon, established the position. In 1977 the second education officer, David Tribe, was appointed who continued to further and extend the influence of the League. In 1981, owing to government cutbacks, these positions were amalgamated and a new position of Environmental Education Consultant/Gould League was created.

From 1974-1981 Environmental Education was promoted and established in a great many schools in NSW. Requests for assistance from teachers were met by school visits, inservice courses, lectures, demonstrations, assistance in structuring environmental programs and resource materials. Content included sensory environmental awareness, use of school grounds and environs, establishment and use of natural areas, energy education, urban, natural and marine environmental education. Students ranged from kindergarten to year 12, colleges of advanced education, university groups, field studies and community groups. Interest was maintained through a 10-minute weekly segment on TV.

Realizing that all the requests for assistance from teachers of the services of the education officer could not be met, a Gould League Coordinator network was established all over the state. This network comprised college and university lecturers, field studies center teachers, administrative staff in schools, classroom teachers and the general public. These coordinators have various Gould League publications and act as an immediate support for teachers requiring assistance.

Publications

Through support from the Department of Education, the Gould League is given a grant to produce publications on environmental education. Its regular publication is called the Gould Leaguer which gives teachers guidelines for ideas in environmental activities and programming. In addition, the Gould League produces the E Kids Magazine designed to educate children about the environment. These publications are given free to schools.

National Conference of Gould Leagues

Realizing that there were other Gould League organizations working independently in Victoria and Western Australia, the Gould League of New South Wales organized the first national conference of Gould Leagues in Sydney, in 1976, where New South Wales, Victoria, Western Australia, South Australia and Queensland were represented. Each year since 1976 these annual conferences have continued and have done much to unite and coordinate the work of the Gould Leagues throughout Australia. These conferences contributed to the eventual formations of the Australian Association for Environmental Education.

Celebration of Special Days

In order to bring teachers' and children's attention to specific environmental events, a number of special days are celebrated throughout the year. These celebrations are Arbor Day, Wattle Day, Earth Week, Bird Month and Bird Day. In connection with Bird Day, the Gould League conducts an Operation Birdwatch where children from all over New South Wales count the number of birds and species found in their school grounds. This information is returned to the Gould League office where it is collated and the results printed on maps of NSW.

Environment Awards

Annually the Gould League presents environment awards to New South Wales schools for worthwhile projects completed by children in schools on any aspect of the environment or environmental education. The award takes the form of a plaque, suitably engraved.

Cayley Memorial Scholarship

In memory of the ornithologist Neville Cayley who wrote the famous Australian book entitled "What Bird Is That," the Gould League offers an annual Cayley Memorial Scholarship for an approved project or undertaking, designed to promote wildlife management, particularly in relation to bird life.

Promoting Field Studies Centers

The League helped to establish the field studies center at Wirrimbirra, Bargo south of Sydney with the donation of a large sum of money to build the "J.E. Roberts Memorial Classroom." It also donated a large sum of money to pay for the erection of a classroom at Longneck Lagoon Reserve so that the site could be established as the Longneck Lagoon Field Studies Centre. This centre is on the edge of Sydney's western suburbs. Children from all over New South Wales raised money to fence the whole of Longneck Lagoon area. This was a positive way to involve children in environmental education.

Introduction of Environmental Education Ideas from the United States

During 1980 the Gould League hosted Duane Toomsen, Environmental Education Consultant for Iowa, in New South Wales to conduct a series of environmental education inservice workshops. A similar hosting occurred in 1981 with Joseph Cornell of "Sharing Nature With Children" fame. Both of these people greatly assisted large numbers of teachers with the latest ideas and trends in environmental education in the United States. This input helped many teachers to develop their own programs and ideas for use at the local school and district level.

Gould League Headquarters and Present Input

The Gould League has established its own office, display area, library and conference area as an environmental centre in the grounds of Beecroft Primary School in Sydney. It distributes and sells the latest resource material and publications and is acknowledged as the leader in promoting environmental education in schools. The centre has established agencies throughout NSW to promote its materials, whilst at the centre itself a demonstration native garden has been created for school use.

Annually a competition is conducted by the Gould League. In 1982 the topic was the "Year of the Tree." This theme was celebrated throughout Australia as the first year of a 10-year greening program. The standard of entries was extremely high, incorporating contributions from kindergarten to year 12 students and covering a wide scope of media. The theme for 1983 is centered around "Our Endangered Species."

The growth of environmental education is considered so important that each Education Region throughout NSW has been asked by the Department of Education to form its own environmental education committee, under the chairpersonship of a District Inspector. These committees are formed by the selection of teachers with outstanding expertise in environmental education and naturally many of these people are Gould League coordinators. The committees cater to the special needs of their own area. During 1982, some have created suitable resources, printed news sheets and have led inservice courses. All regions and activities are assisted by the Environmental Education Consultant/Gould League and ideas and expertise are exchanged at their combined conference.

The Gould League has come a long way in 75 years. Edward Webster and Walter Finigan, its originators, would no doubt be very excited with the progress that the League has made in introducing environmental education to many people. Indeed, environmental education has not been taught but rather caught. Environmental education has shown teachers and children that they must have a stewardship approach to the managing of the spaceship earth, which they depend on for their very existence.

IV.W. Tuntawiroon, Nart. "North-South Dialogue". Faculty of Environmental Resource Studies, Mahidol University, 25/25 Phutthamonthon 4, Salaya Nakornchaisri, Nakornpathom 73170, Thailand.

(No text has been made available.)

IV.X. Webb, Joan. "An Australian Contribution to Environmental Education in Thailand." Kuring-gai College of Advanced Education, Eton Rd., Linfield, N.S.W., Australia 2070.

One of the significant needs in Thailand today is support for its programme of environmental education. This paper outlines the success of nine in-service courses held for teachers at Pranakorn Teachers' College, Bangkok, during 1981-84.

The Need

"In response to world concern on environmental quality, Thailand has taken the initiative in introducing a new curriculum on environmental education for the school system. As it is still in its early stages of development, it is in need of firm support." (Conservation for Thailand, 1979.)

"In-service training should be organised for established teachers who have already graduated, as a matter of urgency." (Conservation for Thailand, 1979.)

Thailand has a conservation policy, it has a new curriculum, but its teachers are unprepared, and resources non-existent. The Thai teacher would be the first to admit that he has operated for too long on the principle of "chalk and talk." Thai teachers themselves see the need to develop the techniques and skills needed to lead field trips. Especially in elementary schools, but at present they wander around without objectives--there is no written resource material for guidance.

The author visited Pranakorn Teachers College in July 1980 with a group of students from Kuring-gai College of Advanced Education. These students were taking their final practice teaching session in local Thai schools, staying on campus, and helping teach English to college students and evening adult classes. A seminar on environmental education was given by the author to the Science staff of Pranakorn and this was followed by a request to return in 1981 to conduct an in-service course for local teachers. Pranakorn Teacher's College takes the responsibility for teacher in-service in Bangkhen District, Nonthaburi Province and Patomthani Province.

The Response

"The education of teachers in conservation and environmental issues should emphasise the importance of practical work and encourage them to adapt their teaching to the local environment." (Conservation for Thailand, 1979.)

Emphasis in the curriculum is on the need for conservation, but a much more basic need was seen to be knowledge and skills in how to use the local environment in order to understand the basic principles of ecology and their application to conservation.

A programme was drawn up for a three-day course in July 1981, the main objectives being:

1. to develop an awareness of the natural environment;
2. to develop skills in observation and recording;
3. to gain knowledge in the basic principles of ecology.

General sensory awareness activities were carried out with materials in the lecture room, and with materials in the College grounds. Emphasis was placed on the need for children to use as many senses as possible in their study of the environment--sight, touch, smell, and hearing. Simple materials from the local environment were used in activities designed to develop more careful observation and accurate recording.

Four basic principles of ecology were presented as a guide to a study of any natural environment. First these were applied to a study of ten mini-habitats in the College grounds, and then to a major ecosystem, the rocky shore at Bang Saen, on the Gulf of Siam (a two-hour bus trip down south). The four basic principles or concepts are:

1. the diversity of living things;
2. the physical factors of the environment;
3. adaptations to the environment;
4. inter-relationships in the community.

At the end of the course, the teachers agreed: "You have introduced us to a new way of thinking, a new method of teaching."

The Pranakorn staff members were looking ahead. "We are just beginning to understand. There are more teachers who need to listen and learn. Come back in January."

In January 1982, two courses were held, a three-day course for elementary teachers, and a four-day course for secondary-tertiary. This time, the field was expanded to include the man-made environment, and fresh-water studies in ponds of the college grounds.

"For in-school education, more emphasis is expected to be put on the individual's interaction with his environment, and on responsible participation in community activities to preserve and improve environmental conditions." (UNESCO Bulletin, June 1981.)

Observation of the local human environment to include traffic, houses, food stalls, pollution, temples, schools, etc., was followed up by the preparation of posters which told the story with polaroid pictures, magazine cut-outs, and suitable captions.

For the secondary teachers, the fresh-water study was directed at a comparison of a large clear pond with a small polluted one, with collection of samples being followed by tests in the laboratory.

In these two courses, an effort was made to relate activities to actual local conditions--a local school (whose environs were simple but taught many useful ecological lessons), the fresh-water pond (common in most school grounds), the streets nearby, and the nearest major ecosystem, the rocky shore.

Teachers attending these courses came from the Bangkhen District. They said to the Pranakorn staff, "We need written resources; the children need field note-books; the teachers need hand-books. Let us have a workshop to prepare resource material." The request came again, "Will you come back in July to help us write resource materials?"

The Bangken District teachers went back to their schools; they tried the activities they had seen in January; they enrolled again for July, 1982.

Two similar workshops were held in July 1982, but the emphasis was different. The elementary workshop concentrated more on integrating the environmental material with other subjects in the curriculum; the secondary workshop aimed to satisfy the requirements of the science and social studies curricula. Each workshop of nine days was conducted as follows:

Day 1: (i) How to write a unit.
(ii) Setting objectives.
(iii) Format for worksheets.
(iv) Excursion to local school.
Day 2: Writing student workbook and teacher's guide on Using the School Grounds.
Day 3: Excursion to the rainforest and freshwater creek in Sam Lan National Park. Overnight stay.
Day 4: (Saturday) Initial steps in preparation of written materials.
Day 5: Written materials completed for National Park Study.
Day 6: (i) Student preparation for an excursion to the Zoo.
(ii) Visit to Dusit Zoo.
Day 7: Preparation of written materials for students and teachers visiting the Zoo.

Day 8: Visit to the rocky shore at Bang Saen.
Day 9: Preparation of written materials for students and teachers visiting the rocky shore.

Lack of expertise in the Thai language made it difficult for the visiting lecturer to help in the writing sessions; supervision and correction of manuscripts fell heavily on the shoulders of two senior Thai lecturers; the young typist worked late each afternoon, the laboratory attendant was busy in the print-room. By the end of Day 8, all the participants had three sets of materials to take away, each set of notes neatly bound and ready for trial runs. Day 9 notes were to be posted within a few days.

During the closing hours of Day 9, discussions were held on the procedure for trialling the materials, all trials to be completed by December when the author returned to Bangkok for a week to obtain a progress report. In the trials, questions such as the following were asked:

1. Do the activities fulfill the objectives?
2. Is the degree of difficulty of the activity suitable for the student?
3. Is the workbook easy to read and understand?
4. What is the estimated time for each activity?
5. Are the proposed activities accurate in their factual content?

In Thailand, a comprehensive in-service programme is conducted for teachers by The Institute for the Promotion of Teaching Science and Technology (IPST). However, the IPST programme does not help teachers to relate the curriculum to the actual environment. IPST trains teachers to follow the curriculum but the Pranakorn Project is training teachers to be independent by writing their own resource materials for a number of field trips which will form a pattern for all other such trips.

Following feedback from the trial runs, the Pranakorn staff rewrote some of the resource material during 1983, and made it available for circulation.

In January 1984, the concept of environmental education for schools was expanded to include the infant level--two five-day courses were held with integration, sensory awareness, and creative work the major emphases.

July 1984, saw the first attempt to spread the in-service net wider, with a repetition of the primary level course and plans to spread the project nationwide.

In April-May 1983, three science staff members from Pranakorn attended a programme in Environmental Education specially designed for them at Kuring-gai College of Advanced Education. Two more lecturers took part in a similar programme in May 1984. In this way, the Pranakorn Project in Environmental Education is being reinforced and complemented.

The Belgrade Charter makes it clear that environmental education leads to the recognition, prevention and solution of environmental problems. The Pranakorn people ask: "Where do we go from here?" The obvious answer is, a study of local environmental issues and the role to be played by the community. But what would be the reaction of government to a foreign consultant who attempts to offer a programme on local environmental issues, each one of which must have a political component? The decision to conduct such a programme has yet to be made. But one definite line of action will be taken--the author will help establish at Pranakron a Centre for Environmental Education where teachers can come for advice and resource material.

In a nationwide radio broadcast in July 1982, the author was asked: "Why do you come to Thailand?" The following answer appears to be a fitting conclusion to this Australian contribution to Thai education: "The world is facing an environmental crisis as resources become scarce and the population increases. Thailand has excellent laws on conservation--it has a policy on conservation, but no one knows what to do with this policy. People in Thailand must develop a new awareness of the environment, and at Pranakorn we are starting with the teachers--a new awareness in teachers means a new awareness in their students. I believe I have certain skills in the field of environmental education, and I discovered a need in Thailand. I think I have a responsibility to other countries as well as my own."

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The Council for Environmental Education was set up in the UK in 1968, and has continued to play an increasingly important role in generating both formal and non-formal environmental education initiatives. The work of the Council was detailed and a "model" outlined for implementing environmental education.

IV.Z. Panel: "A Network in Conservation, Natural Resources, and Environmental Management Education: A Model for the Eastern Caribbean." Panel Chair: Robert E. Roth, The Ohio State University, 2021 Coffey Rd., Columbus, Ohio 43210, USA. Panelists: Elsa Talero, Doctoral Candidate and Fulbright Scholar, Bogota, Colombia, South America; Alfredo Morillo, Director of Environmental Education, Ministry of Agriculture, Santo Domingo, Dominican Republic; Jill Sheppard, Executive

Director, Caribbean Conservation Association, St. Michael, Barbados; John Disinger, Associate Director, ERIC/SMEAC, The Ohio State University, Columbus, Ohio 43212, USA.

The establishment of a communications network is proposed as a means of achieving the considered goals of institutional development, effective materials modifications and production, information base establishment and retrieval program evaluation, and the monitoring of knowledge gain and attitude shift over time. Panel presentations and discussion focus on existing components of such a network that should promise for further implementation.

1. "A Research and Development Communications Network for Conservation, Natural Resources and Environmental Management Education in the Wider Caribbean." (Robert E. Roth)

Global concern about environmental problems, quality of human life and the impact of development led to the convening of the United Nations Conference on the Environment in Stockholm, Sweden, in June of 1972. The recently concluded tenth anniversary of the Stockholm Conference stressed the need and role for environmental education (Connect, 1982).

Recommendation 96 of the Stockholm Conference called for the establishment of an international program in environmental education that would be interdisciplinary in approach, formal and non-formal, encompassing all levels of education and directed toward the general public (UNESCO, October 1977).

During the past decade four dominant trends are recognizable according to the Global Perspectives Quarterly (1983) (IUCN, October/December 1983). First, popular and scientific interest in environmental quality have combined to establish a new kind of conservation movement. Second, there has been an explosion of environmental data, but much of the information is of limited use in assessing trends as a base for decision making, action and evaluation. Third, new understanding of the structure and functioning of environmental systems provides opportunity for more reliable planning. Finally, it is apparent that the lack of social organization, training and political will are the common limiting factors in improvement of the environment and quality of life.

Environmental and natural resources agencies now exist in 144 countries, a 500% increase in only 10 years (Global Perspectives Quarterly, Fall 1983). Such agencies are increasingly involved in establishing natural resources and environmental management programs involving substantial land areas and equipment, many professional personnel and clients, and considerable financial resources. In addition to the short-range goals of reversing trends involving soil erosion, deforestation, environmental degradation and water conservation problems including health and sanitation in developing countries, a commonly stated major goal is: "development of an environmental ethic in the people of the country" (The World Environment Handbook, 1984). Yet, effective research and development in environmental management education remains a key problem. Similarly, there are few effective evaluation strategies that can provide both short-term and long-term evaluation or program effectiveness.

AN R & D COMMUNICATIONS NETWORK

The identified needs must be addressed in meaningful context. The establishment of a workable Conservation, Natural Resources and Environmental Management Education Research and Development Communications Network that can systematically address the broad issues of training, information dissemination, materials development and the evaluation of materials, projects and programs can provide that context. Such efforts are essential in relation to both the formal and nonformal education communities if the goal of an environmentally literate citizenry and quality life are to be achieved in the developing countries of the world.

Perceived needs were identified in relation to work in both the English and Spanish speaking Caribbean, funded by U.S. A.I.D. in relation to three years' work through an OSU Title XII Strengthening Grant, and a five-year Natural Resources Management (NARMA) project with the Dominican Republic and its Ministry of Agriculture.

The strategy that would seem to be the most appropriate is to build on existing institutional bases and educational structures for the development of trained personnel, materials, disseminating strategies, message targeting and evaluation, through the establishment of the Network. A program of research and development in the Caribbean through environmental management education was initiated by the Division of Environmental Education at OSU in 1981. Projects involving U.S. A.I.D., the OSU/AID Title XII program, the Ministry of Agriculture in the Dominican Republic and the Caribbean Conservation Association headquartered in Barbados have been established to incorporate relevant information about international environmental issues into existing courses at OSU and to provide assistance to developing countries in the development of useful environmental management and educational strategies. A basic goal continues to be to help the people of the various nations develop an environmental ethic and to institutionalize appropriate training and environmental management education programs that lead to greater educational, economic and social well-being.

ELEMENTS OF THE PROPOSED COMMUNICATIONS NETWORK

The proposed Research and Development Communications Network emphasis will be to: Strengthen institutional capability in the development of needed information systems and materials on conservation, natural resources and environmental management education; develop the capacity of cooperators to produce an appropriate data base in response to changing identified needs over time; assist in designing appropriate environmental education plans, and strengthen agency, institutional and organizational cooperation in conducting long-term evaluations and short-term investigations with implications for practice.

Project Format

The proposed Network, when established, is intended to function by utilizing a Network Support Center at The Ohio State University and a Network Research and Development Center located in each cooperating country. Each Center would be governed by a director with guidance provided by a steering committee. Communications would be maintained through the use of microcomputer linkages thereby providing effective information transmission, storage and retrieval. The development of a relevant data base, subsequent materials production, and a clearinghouse service for information, evaluation, and expertise are typical outputs expected from the functioning of the Network. A quarterly newsletter would be produced with each Center adding a page unique to that country.

Project Sequence

As a first step in establishing the Research and Development Communications Network it is proposed that a Workshop in Conservation, Natural Resources and Environmental Management Education be conducted in Barbados in early 1985 in cooperation with the Caribbean Conservation Association, the University of West Indies and selected developing countries of the English speaking Caribbean. As a means of establishing the proposed Research and Development Communications Network structure a series of goals are specified below that are to be accomplished during the proposed workshop.

1. To identify counterpart conservation, natural resources and environmental management educators and scientists in each participating developing country of the Eastern Caribbean.
2. To define appropriate evaluative strategies and research needs in relation to conservation, natural resources, and environmental education development in countries of the Eastern Caribbean.
3. To determine the current status of conservation, natural resources and environmental information and programs development in each cooperating Eastern Caribbean nation.
4. To assist participants in developing procedures by which baseline data can be developed concerning environmental, conservation and natural resources concepts and attitudes held by various segments of society in each of twelve cooperating Eastern Caribbean nations.
5. To initiate exploration of the application of conservation, natural resources and environmental information and education practice and procedures to problems in developing countries of the Eastern Caribbean.

6. To produce a document suitable for publication detailing current status and identified research needs in conservation, natural resources and environmental information and education in participating countries in the Eastern Caribbean.

Network support would: (1) facilitate communications; (2) implement policy decisions; (3) insure appropriate evaluation; (4) monitor the use of resources; and (5) conduct workshops involving materials production, microcomputer applications and evaluations.

The Center Directors would:

1. establish a Center in each cooperating country;
2. modify materials to meet identified needs;
3. participate in evaluation strategies;
4. train educators, communicators and interpreters;
5. meet periodically with other network directors to review policy programs and to share information.

Potential Benefits

The proposed research and development effort, when fully implemented, will provide a basis for evaluation of conservation, natural resources and environmental management programs, and the evaluation of knowledge and beliefs held by various clientele groups in the cooperating nations and their changes over time. It is anticipated that program benefit would occur in relation to the stabilization of natural resources degradation, development of sound natural resources and environmental management education programs in the schools, colleges and universities and for the general public. Monitoring of such programs over time as a means of assessing cost effectiveness and enhancing sustainable development would help assure the development of a quality of life and environment in the most economical manner.

Benefits to the U.S. citizen, funding agencies and organizations concerned with conservation, natural resources and environmental management will include:

1. Establishment of effective evaluative strategies of use in measuring program effectiveness as determined by knowledge gain and attitude shift on relevant conservation, natural resources and environmental quality issues.
2. Establishment of procedures to define a baseline of environmental information and beliefs possessed by various clientele and voting citizens of cooperating countries:
3. Development of strategies for assessing the cost effectiveness of environmental management information and education strategies.

The proposed Research and Development Communications Network will provide a mechanism for the effective management of natural resources and the development of sound programs in environmental learning. The accessibility of useable information is essential for the fulfillment of basic human needs and the eradication of poverty while achieving the goal of sustained development. Reversing the trends of soil degradation, deforestation, desertification, pesticide impact and rampant population growth will require intense environmental education at all levels. The formal and nonformal sectors will have to be utilized effectively. The proposed Research and Development Communications Network for conservation, natural resources and environmental management can provide the necessary framework for the development of an environmental ethic and improvement of the quality of life for people of the Wider Caribbean.

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Overview

The Dominican Republic shares with Haiti, the Island of Hispaniola, the second largest of the Antilles. Occupying the eastern portion of Hispaniola, the Dominican Republic covers 48,442 square kilometers (KM^2) (30,276.25 M^2). In a natural resources inventory (1965-66) carried out by the Organization of American States, the country's land was classified according to its production capability as is presented in the table below. (#1)

Table I. Land Capability Classification (AID, 1981)

Class	Km2	%	Production Capacity
I	537	1.1	Excellent for Cultivation
II	2,350	4.9	Very Good for Cultivation
III	3,122	6.6	Good for Cultivation
IV	3,639	7.7	Limited or Marginal for Cultivation
V	6,071	12.7	Pasture; no erosion hazard
VI	5,611	11.8	Pasture; Erosion Hazard
VII	25,161	52.7	Forest
VIII	1,202	2.5	Wildlands
	47,693	100.0	

In 1967, tree cutting was prohibited and the sawmills were closed. At the same time, the Military Forces took over the national forest. However, those measures were not enough to stop the progressive degradation of natural resources. In fact, many people continued cutting trees for different reasons, such as growing crops, building houses, and raising cattle; of course, these activities were illegal because the Law 5856 (1967) prohibited this action.

For these reasons, "deforestation continues largely unabated in the broad-leaved forests" (Dominican Republic Environmental Profile, AID, 1981). The other renewable natural resources, such as water, soil, and wildlife were affected, too. Many former sawmill workers became little farmers who began to grow crops on the Condilleras (forest lands); however, they did not know how to conserve the soil and control erosion in order to obtain good production for long periods of time. In addition, no educational program was developed with those people.

The soil loss is one of the most important problems in the Dominican Republic. We are losing, through erosion, about 500 tons/ha/year in the most critical watershed. The Dominican Republic Environmental Profile remarks:

> "The Dominican Republic faces very serious challenges involving food, energy, and population that have already caused substantial environmental degradation and portend a bleak future not only for natural resources, but for the country as well." It continues: "In this decade (1980s) the Dominican Republic must accomplish what she has been unable or unwilling to do in the recent past."

This is certainly true. However, in late 1978 the problem concerning natural resources was seriously considered by the new government. Indeed, three soil conservation projects were implemented at that time in three different, critical watersheds. Joined to those projects was the first environmental education program led by the Secretariat for Agriculture (Subsecretariat of Natural Resources).

ENVIRONMENTAL EDUCATION PROGRAM

Activities

The Environmental Education Program developed two types of activities: (1) conservation education, and (2) environmental education, itself.

Conservation education: the conservation activities were led for little farmers (Campesinos) located in the most disturbed watersheds. It was the first time that a conservationist message was taken to the campesinos who work in the cordilleras.

These activities started with informal meetings to which community leaders were invited. For cultural patterns, the first step in any rural community must be to meet the local leaders. After several meetings only a few people accepted conservationist works in their small farms. The environmental education team had the responsibility to the project of teaching campesinos about the erosion problem and the accurate methods for its control.

After two or three months the campesinos began to realize that the conservationist technicians wanted to help them. Then, many campesinos offered their lands for soil conservation works and attended every meeting scheduled.

Environmental Education: While conservation education activities were implemented in the watersheds, others were developed in the urban area. An agreement with the Education Ministry was reached for training in-service teachers and students. Other institutions and organizations, public and private, offered to help in order to organize an environmentalist movement. At the same time, audio-visual materials were made, and workshops designed. These workshops were designed according to type of audience and local or regional problems. In addition to these activities, a T.V. program was presented and committees for conservation were organized.

The scope of the environmental education was nationwide. At that time the audience was divided into: farmers and no farmers (campesinos); teachers (in service and pre-service); students (different levels); agricultural technicians (extension agents); community leaders; organized groups; and public in general.

The Dominican Republic, as is well known, is a developing country with economical problems. However, in 1978 the new authorities considered it necessary to support a program for environmental/conservation education. Indeed, the program had the necessary resources for operating.

In early 1979, an environmental education project was presented to the Inter-American Development Bank (IDB) joined with one general training project in agriculture. It began in late 1980. Another project was approved by UNESCO in 1980. It was an experimental project developed in a specific area and its major goal was to teach people about natural disasters, especially hurricanes.

In 1980, a Natural Resource Management Project (NARMA) was presented to the U.S. AID which included a component for environmental education.

NARMA PROJECT: Environmental Education Component: It is the first interdisciplinary and interagency project implemented in the Dominican Republic in the natural resources area. It is being supported with funds from the Dominican Government and the U.S. AID. The NARMA project could be considered having the best purpose for natural resources management and agency integration. Its general purposes and goal are:

-to strengthen the institutional capability to effectively promote the development of the country's natural resources.
-to establish a soil and water conservation model that can be used to help stop the degradation of the nation's natural resources.

Goal.

The goal of the project is to increase the income and standard of living of the rural poor.

In order to reach the purposes and goal, NARMA project has several components including environmental education. The specific objectives and goals of this component are:

-develop an environmental education campaign in both nationwide and watershed levels.
-develop environmental education materials for workshops and specific messages targeted for school teachers, farmers, technicians, and community leaders.
-develop criteria and procedures for evaluating the impact of mass media programs for natural resources education and workshops given to farmers, local leader, technicians, and the general public.

The environmental education activities are developed both at the national as well as watershed levels. This component is working in formal and informal education as well as conservation education. Posters, written bulletins, pamphlets, radio programs, T-shirts, bumper stickers and video tape of the project have been prepared for the mass media program. Curricula for environmental education for grades 1-6 have been designed with activities description. A number of programs for short courses have been designed with different target groups in mind. Also, following the curricula suggested by Dr. William B. Stapp (Perspectives, UNESCO, 1978), modules for auto-instruction are being written for teachers.

In 1982, the first national conference about environmental education was held. It was sponsored by the NARMA Project, Environmental Education Component, Universidad National Pedro Henriquez Urena, and The Ohio State University-Division of Environmental Education. About a hundred people from different agencies, universities, and conservationist groups attended this conference.

In order to reach the goals, the environmental education activities have been designed according to: the audience interest in specific conservation topics; the local problems; the utilization of local and regional organizations and committees; the urgent necessity of our country in food-crop production; and the cultural patterns.

SUMMARY

Environmental education activities are relatively new in the Dominican Republic. Consequently, people who are implementing those activities have, (most of them) empirical knowledge about environmental education because they are not graduates in this area but in other related areas.

However, environmental education has gained power in the Dominican Republic and a few people are (and will be) studying environmental education, natural resources management, forestry, and soil conservation.

The present activities are going to be reinforced when the Jimenoa Training Center will be completed this year. It is a National Center for training in Natural Resources Conservation by the Department of Environmental Education.

In the same way, a strategy for Environmental Education Activities was written and recently began its implementation.

We have a great challenge. We are willing to accept it. We need to work hard in order to control the natural resources degradation and to improve the standard of living of our people. Environmental education is one way to reach our goals. We believe so.

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V.A. Baer, Richard A. "Preserving Human Freedom in a Time of Environmental Crisis." Professor, Department of Natural Resources, New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York 14853, USA.

As the United States and other nations grapple with environmental problems, and particularly as the need for more environmental regulations becomes apparent, governments will likely increase their control over the lives of citizens. This will be necessary to preserve productive farmland, limit population growth, regulate toxic wastes, limit the depletion of non-renewable natural resources, and ward off environmental disasters which might result from such developments as acid precipitation or the worldwide increase of atmospheric carbon dioxide.

With particular reference to the United States, the question was posed: How will we be able to preserve personal and societal freedom in a time of increasing government control? In particular, the discussion was focused on schooling and government's role in schooling.

Small minorities of both liberal and conservative thinkers today go so far as to argue that the present structure of government schools in the United States is unconstitutional, particularly at the elementary and secondary levels. This system, dependent as it is on monopoly government financing, violates--so they hold--basic free speech and freedom of religion provisions of the First Amendment. These critics argue for various changes, including the disestablishment of the government monopoly position in financing. The presentation showed why there is substance to these arguments.

This paper focused on the United States, but it has relevance for all nations concerned with government's role in schooling and the preservation of freedom in a time of global environmental problems and a deepening awareness of planetary environmental limits.

In particular, discussion focus was on the teaching of values, including environmental values, in government schools, and the presentation made clear why problems such as which values to teach, censorship of textbooks and library books, and whether prayer should be permitted in public schools, are so difficult to resolve under present circumstances.

V.B. Martin, Jim and Diana Thompson. "Government Support and Leadership in Environmental Education." Head, Environmental Education Branch, Alberta Environment, 9820-106 Street, Edmonton, Alberta T5K 2J6, Canada; Environmental Education Co-ordinator, Alberta Recreation and Parks, 1001-9929 113 Street, Edmonton, Alberta T5K 2N9, Canada.

Executive Summary

The purpose of this paper is to trace the key role that provincial government departments have played in furthering the growth of environmental education in Alberta. It describes the level and type of provincial involvement past and present and makes recommendations for the future.

The historical perspective, analyzed through a process model, includes major thrusts from government and non-government sources which culminated in provincial government involvement through funding, policy development, facilities, materials and personnel support.

An examination of the current situation outlines the influence of government departments in and on environmental education programming. A comprehensive overview including specific examples from within government will be given to illustrate program thrusts, level of funding, specialized environmental education personnel and target markets.

The factors influencing future directions in government environmental education programming efforts will be explored through an examination of the environmental, social, political and economic pressures that are the reality of the next decade.

Introduction

The purpose of this paper is to trace the key role that provincial government departments have played in furthering the growth of environmental education in Alberta. The paper analyses this role through use of a process model. The authors of this paper feel that the model could be applied in any situation where government is involved in environmental education. The paper is written as a theoretical treatise in hope of generating discussion. It does not reflect the policy or opinion of any government department or agency.

Process Model of Government Response

Government can play two roles in the development of environmental education: that of catalyst and that of leader.

As catalyst, government agencies provide the spark that is needed to generate environmental education activity. This can be in the form of grants, leadership training or program initiatives. In the catalyst role, government provides only incentive or support. It is the grassroots sector that becomes responsible for environmental education development.

In a leadership role, government takes an active role in promoting and ensuring the development of environmental education. In this situation, the grassroots sector depends on government to provide facilities, to train personnel, and to develop a variety of programs and materials.

As catalyst, government seeds environmental education growth. As leader, government provides direction that shapes environmental education development.

In both the catalyst and leadership roles, government can either respond to need or initiate environmental education developments. This is illustrated in the model presented in Figure I which shows the process of interaction between government and the grassroots sector.

Figure I

Likely Responses from Grassroots	Government Role	Government Action
Yes/Yes	Catalyst Responding	We know what you want and we'll supply the support possible.
?/Yes	Leader Responding	We'll do what you think should be done.
No/?	Catalyst Initiating	We think this should be done so here's some support.
No/No	Leader Initiating	We know what needs to be done and we'll do it.

Environmental education development occurs in four ways through this process: leader initiating, catalyst initiating, leader responding, catalylst responding. Let us examine the interplay between the grassroots sector and government when government takes on each of these four roles.

When government as leader initiates environmental education development the government stance is "we know what needs to be done and we'll do it." This will often result in a negative response from the grassroots sector. Because it has not been part of the decision making process, it has no vested interest in the resulting course of action.

When government takes a leadership role that is responsive, the stance changes to "we'll do what you think should be done." This approach receives more support with the grassroots sector due to its potential for meeting direct needs. However, since the initiative does not come from the grassroots sector there is often no commitment and confusion as to what course of action to take and government support is not as effective as it could be.

When government as the catalyst tries to initiate, the stance becomes "we think this should be done so here is some support." Again the grassroots sector resists government control but the possibility for direct support from government is appealing.

When government in the catalyst role is responsive, the stance is "we know what you want and we'll provide the support required." Response from the grassroots sector is positive. Environmental education grows through a strong grassroots support base that initiates development and is supported by government wherever possible.

The role of government will shift and change within this process with varying degrees of success. Ideally, as has been described, environmental education will be strong where there is grassroots initiative supported by government--where government as the catalyst responds to need.

The history of environmental education in Alberta may be traced through an analysis of government's changing role as outlined in the model. In describing the process of government involvement, we are dealing with a theoretical framwork within which to explain events and courses of action that have influenced environmental education growth. This framework is shaped by many factors into reality. The social, economic and political climate influence the role that government can play. The most constant and consistent trend within this context is change.

Analysis of Interaction

The following chart is an analysis, through time, of the interaction of provincial government departments and the grassroots environmental education movement. It attempts, in a very generalized way, to outline the roles and responses of government to the grassroots sector through approximately fifteen years of environmental education development in Alberta. The growth and organization of the grassroots sector is paralleled by growth and organization in government.

Present . . . . TIME . . . . Late Sixties

GRASS ROOTS		GOVERNMENT	
Environmental Educators	**Leadership**	**Service Department**	**Alberta Education**
	Individuals committed to ee/oe identify sources for support from government.	Government sources respond with available funds, generally of a one-time nature. *(Catalyst responding)*	
With greater resource support and interest programs begin to develop and grow.	Pressure on leaders to assist new educators in the field of ee/oe.	Pressure on government departments for more support of an on-going nature leads to need for greater rationalizing within each department's mandate--programs must show a service to the department. Programs developed to meet expressed needs of grassroots also seen as service to department mandates. *(Leader responding)*	Pressure on the department leads to statement of basic support. *(Catalyst responding)*
Programs continue to develop in number and size as support from service departments and education department increases.	Leadership organizes to deal with expanded grassroots interest. General needs of Alberta educators in ee/oe identified and communicated.	Departments develop positions within the bureaucracy to respond and interpret requests of educational community. *(Leader responding)*	Education responds with continued support of ee/oe and through non-specific program funding. *(Catalyst responding)*
Some programs are accepted and meet needs--others are not subscribed to because they did not meet current needs.		Programs are developed that are initiated by this staff based on their interpretation of need. *(Leader responding)*	Some programs developed at the department's initiative. *(Leader initiating)*
	Leadership by committed 'pioneer' leaders is replaced by leadership who look upon ee/oe as a professional responsibility--leadership is of shorter duration and needs of membership not clearly identified and communicated.	Government staff has difficulty responding to grassroots leadership because it perceives their reduced capability to ascertain grassroots needs and because of the sort duration of their involvement.	Coordinator's position developed by the department to deal with ee/oe. Program initiated by the department. *(Leader initiating)*
Educators redirect some interest away from ee as pressures to meet needs of formal curriculum and new curriculum increase. Lack of coordinated ee support continues and ee leadership is less visible.		Programs continue to be initiated by the departments. Program efforts are not effectively coordinated between departments. Programs often lack curriculum credibility. *(Leader initiating)*	Department does not accept responsibility for leadership of coordinated ee responses.

Interventions

Although the preceding chart invites critical analysis of the history of environmental education development, it is important that any criticism allow learning for future well-being. In doing so we would like to focus on three interventions that could have altered the history of environmental education development in Alberta and that can still be applied today to ensure growth of environmental education in the future.

1. The responsibility for all education, including environmental education, lies with Alberta Education. With the growth of interest in environmental education in the province, from the early seventies, the leadership in government could have been assumed by Alberta Education. This would have included direction-giving to the grassroots leadership, coordination of government resource and response and the legitimization within the curriculum of environmental education program.
2. The environmental education leadership could have focused in its needs identification on leadership training and a communication system with its grassroots membership. This would have led to a more knowledgeable and committed leadership with the ability to advise government on environmental education needs and to provide for continuing quality leadership as the "pioneers" retired.
3. Direct communication and formal cooperation between the grassroots leadership, service departments and Alberta Education from the earliest endeavours could have enhanced development in environmental education in the last decade.

Conclusion

As stated, it is not beyond the capability of the environmental education community, including the government service and leadership sectors and Alberta Education, to institute the above interventions as the basis of environmental education action now and for the future.

The broad base of environmental education requires the coordination that comes from a strong leadership. This leadership in turn can depend on fewer but still considerable resources from government. Alberta Education can, in its present restructuring of curriculum, take the initiative to provide the overall direction for environmental education in the future.

It is imperative that, within the confines of the educational curriculum, the needs of environmental educators be communicated to the government sector and they, in turn, respond with continued support.

V.C. Nelson, Kenneth J. "Overview of the Role of the Environmental Education Advisory Committee to the Environment Council of Alberta." Communications Officer, Environmental Council of Alberta, 8th Floor Weber Centre, 5555 Calgary Trail, Edmonton, Alberta T6H 5P9, Canada.

The Environment Council of Alberta (ECA) is a government-owned and funded corporation set up to assist the government of Alberta with its environmental decision making. It has a mandate to review policies, programs and government activities which relate to environmental conservation in this province. ECA supports a small in-house staff. At the same time, the ECA underwrites the activities of several public advisory committees on the environment made up of volunteers from many sectors of Alberta society. ECA staff provides a secretariat for these volunteer committees. These committees advise both the ECA and the government on environmental issues of concern to the public at large.

When requested to do so by the government, the ECA involves the wider public more directly through large-scale public hearings on specific environmental issues. Reports and recommendations go directly from the ECA to government on these occasions.

Since the formation of the ECA in 1970, there has been a public advisory committee on environmental education. At the present time, this committee is called the Environmental Education Advisory Committee, or EEAC, with a membership of approximately 18 people. These people are, for the most part, representing themselves, rather than some outside entity such as a school or an association. They are, however, usually professional educators or communicators who may or may not be associated with the educational system in a formal way. They share a conviction that environmental education is central to the development of a child's intellectual awareness of the world around, and that communicating about environmental concerns--and what can be done about them--is of vital interest to everyone, including educators, throughout life. As a committee, their main function is to give considered advice to the ECA and the government on environmental education in the schools, and on information programs for the public about environmental issues. That is, their role is to assist the ECA to raise public consciousness about the environment, and about ways the public can participate in decisions affecting the environment. It's not an easy task at the best of times, let alone during the worst economic conditions Alberta has faced since before World War II.

> In 1972, this committee set out to identify what was currently being done in environmental education in Alberta, and what directions and initiatives could be pursued. The following year, it concentrated on defining environmental education. No single definition was agreed upon, but several elements were set down.
>
> The committee organized a provincial conference on environmental education for May 1974. The conference had three objectives; to provide a setting for the exchange of information among those interested in environmental education, to direct public attention to the importance of environmental education, and to provide a basis for future planning. A "state of the art" study was commissioned to form the basis for

discussion at this conference. It focussed on the formal education system, provincial governmnent departments and non-government groups.

About 220 delegates from a broad spectrum of agencies and organizations attended this First Alberta Conference on Environmental Education. Its proceedings were published in December 1974. The conference generated 227 recommendations for further action. The Environmental Education Advisory Committee published a condensed version of these under five areas of concern: the environmental ethic, the role of government, the role of universities, teacher education and the role of the educational media. ....These recommendations were endorsed by the ECA and then brought to the attention of the authorities for implementation.

The following recommendations were addressed to all government departments and other institutions and agencies concerned with environmental education:

i) There should be a general campaign of information and education, using all the appropriate media and sophisticated methods of presentation, to emphasize man's role in the environment, taking a holistic view of the relationships between science, economics, aesthetics, social morality and individual growth.

ii) Environmental education should be concerned with all three modes of learning - intellectual understanding, emotional awareness, actual behaviour (i.e. what we can do about it), and with values.

iii) Such learning should be an integral part of educational activities at all levels, i.e. kindergarten to recurrent education for adults.

iv) Action should be taken by all government departments concerned, to work in concert with one another and with the ATA (Alberta Teachers' Association) and ASTA (Alberta School Trustees Association) to prepare information and relevant materials for use in the formal education system.

v) Such concerted action should also be taken to prepare relevant information and materials to be used by ACCESS (Alberta Educational Communications Corporation) and other media agencies in their programming outside the formal education system.

> In 1975 the committee membership completely changed and moved toward more 'public' representation. The committee set about to define its goals, mode of operation and possible future activities. It initiated follow-up on the 1974 conference. The membership structure was changed in 1979 to include six people, each representing one of the Public Advisory Committee study groups. There were to be 12 others, drawn from the public at large
>
> During this time the Public Advisory Committee on the Environment (PAC) also noted matters relating to environmental education. A resolution was passed at the 1979 joint meeting of the Public Advisory Committee on the Environment and the ECA: 'Be it resolved that the provincial government develop educational programs and information outlets to make the public aware of the impact and consequences of existing urbanization trends and the range of urban form and settlement alternatives that are available to them.'
>
> In 1980 the EEAC published a role statement. 'Its purpose is to advise the Council and the Government on matters of environmental education, to comment on environmental programs both within and outside of the formal education systems, and to assist in the formulation, development and implementation of such programs wherever possible.'
>
> During 1981 and 1982 the committee was more active. It outlined an education strategy that would be appropriate to bring about public action on a specific environmental issue. It then applied this to the issue of private sewage disposal. The result was an 'action kit' which was assembled and distributed to members of PAC and members of the Legislative Assembly for pilot test. During this time two sub-committees were established: one, to meet with environmental education co-ordinators in government and the other, to assess the status of environmental education in formal institutions. (Bramm, 1984)

In May 1974, when the "First Alberta Conference on Environmental Education" was held, over 200 Albertans had the opportunity to exchange ideas and develop a basis for future planning. The Environment Council of Alberta's then Public Advisory Committee on Environmental Education, now EEAC, consolidated the many recommendations that emerged. These were directed toward teachers' organizations, government, universities, the media and other agencies concerned with environmental education.

This June (1984), the Environment Council of Alberta and Alberta Environment sponsored the "Communicating Environmental Trends" conference. Delegates to this conference discussed environmental education past, present and future. This conference was billed as the second Environmental Conference for Alberta, and from it came a further set of recommendations:

MAJOR RECOMMENDATIONS

1. That a study of the environmental movement in Alberta, including a history of the movement and an assessment of its accomplishments, be undertaken.

   That Alberta Environment take a lead role initiating and/or funding aspects of this assessment.

2. That a conference be held to expand on aspects of communicating environmental issues.

   That this conference include and be funded by environmentalists, educators, government, industry and the media.

SUPPLEMENTARY RECOMMENDATIONS

3. That a clearinghouse be established to increase access of environmental information from diverse sources (e.g. government, industry, environmental groups).

4. That the existing mode for networking amongst environmentalists, environmental educators, government, industry and the media, be identified.

5. That there be public service announcements to increase public awareness that environmental protection is everyone's responsibility.

In the light of the recommendations from the 1984 conference, it seems that the more things change, the more they stay the same. The 1974 conference was about formal education, and the 1984 conference was about environmental communications in a broader sense than formal education. Yet, both conferences, and the Public Advisory Committee, and so many others, speak of the need to "network", and to make information clearinghouses that actually work available as a real public service, information remains the challenge. How it gets packaged may change, but the basic need for it remains, I am afraid, largely unfilled. Those packages are not getting delivered often enough.

Ken Nelson

REFERENCE

Bramm, Susan. Environmental Education in Alberta: The Last Ten Years. Edmonton: Environmental Education Resources Branch, Alberta Environment, 1984.

V.D. SYMPOSIUM: "Canada/U.S. Environmental Relations". CHAIR: Alan M. Schwartz, Director, Environmental Studies, St. Lawrence University, Canton, New York 13617, USA. PRESENTERS: John H. Baldwin, Department of Planning, Public Policy and Management, 156 Hendricks Hall, University of Oregon, Eugene, Oregon 97403, USA.; George Francis, University of Waterloo, Ontario N2L 2R7, Canada.; Joel J. Sokolsky, John Hopkins University, School of Advanced International Studies, Baltimore, Maryland, USA.

The United States and Canada share the longest border between any two nations in the world as well as the longest water boundary. Opportunities for environmental conflicts across this border are numerous and it is indeed a significant indication of the effort both nations have put forward that the problems between the two nations are not more numerous and do not result in more conflict. Although acid rain is a well known problem, other problems, and the mechanismns to solve these problems, are crucial to the fate of the environment shared by these two nations. This symposium examined acid rain, fisheries, and water resource problems between the U.S. and Canada, as well as the mechanisms by which each country tries to influence the other.

1. "Canada, Congress, and Transborder Environmental Issues". (Joel J. Sokolsky).

This paper examined the role of Congress in the resolution and/or lack thereof, of environmental issues that have arisen between Canada and the United States. While the two national governments and joint bodies such as the International Joint Commission are the most salient actors in transborder environmental issues, Congressional action can, and has, had a profound impact on the ability of the two national governments to arrive at mutually acceptable solutions to such issues. Moreover, because the ultimate resolution of particular problems depends upon funds voted by Congress, the legislative branch is often important in determining whether the United States will be able to live up to its obligations.

The paper reviewed several case studies, such as the Great Lakes Water Quality Agreement, the Garrison Diversion and Acid Rain, to indicate the importance of Congress in this area of Canada-U.S. relations. It also examined the efforts on the part of the Canadian federal government, (and various provincial governments) to lobby Congress on environmental issues. While it is clear that Canada cannot ignore the views of Congress on such issues, it is less certain that Canada can influence Congressional action in ways favourable to its own environmental interests.

2. "Acid Rain: The Science and the Conflict". (John H. Baldwin).

In the past four years, the conflict between the Canadian and American governments over the problem of acid rain has escalated to a point of serious international conflict. This paper briefly summarized recent findings on the acid rain problem, then characterized: (1) the parties in conflict; (2) their positions; and (3) the scientific, political, and economic foundations of these positions. The alternative solutions proposed by industry and the Canadian and American governments was discussed with reference to the efficiency of the cleanup, the costs, and the equity of economic and environmental impacts.

3. "The Resolution of Environmental Controversy by International Diplomacy: The Case of the Skagit River/Ross Dam Controversy". (Alan M. Schwartz).

The City of Seattle received approval from the International Joint Commission over forty years ago to raise the height of a dam which would flood up to 5,000 acres of British Columbia. As plans to raise the dam were being finalized thirty years later, the new environmental consciousness of the 1970's led to protests from British Columbia about the proposed flooding. British Columbia asked the International Joint Commission to nullify previous approvals to raise the dam while Seattle steadfastly maintained that it had the legal right to proceed. In 1983, the commission used new and untried techniques by creating a joint consultive group comprised of members of the IJC, representatives of the governments of Canada and the United States, the Province of British Columbia and the City of Seattle as well as two independent technical advisors, in order to bring resolution to this conflict. The IJC departed from its usual role of fact finder and instead became active mediator working toward a problem resolution that would not only satisfy both parties, but would uphold the intent of the boundary Waters Treaty of 1909. This paper emphasized the new methodologies used by the Commission and the environmental amenities that were thus protected. Speculation on the applicability of this technique for the resolution of other transboundary environmental issues was discussed.

4. "International University Study on Great Lakes Ecosystem Rehabilitation". (George Francis).

V.E. Panel: "Information and Dissemination Systems: Recommendation, Realities, Possibilities". PANEL CHAIR: David L. Hanselman, Professor, Department of Landscape Architecture, College of Environmental Science and Forestry, State University of New York, Syracuse, New York 13210, USA. PANELISTS: Tony Angell, Supervisor, Environmental Education Programs, Washington State Dept. of Education, Northwest Section, 18237-40th Avenue, NE, Seattle, Washington 98155, USA; Augusto Q. Medina, Education Specialist, RARE, Inc., 1601 Connecticut Avenue, NW, Washington, D.C. 20009, USA; John F. Disinger, Associate Director, ERIC/SMEAC, 1200 Chambers Road, Columbus, Ohio 43212, USA; John J. Padalino, Director, Pocono Environmental Education Center, R.D. 1, Box 268, Dingmans Ferry, Pennsylvania 18328, USA.

Recommendation 33 of the First National Congress for Environmental Education Futures: Policies and Practices calls for the invention, implementation, and institutionalization of an expanded information system for collecting, describing, indexing, and disseminating materials useful in environmental education. Panelists addresesed these questions - What specific services are requested, explicitly and implicitly, by this recommendation? To what extent might an integration of existing systems provide them? What else is needed? What alternative models of meeting the specifics of this recommendation are possible and implementable? Who would use such services, and to what extent, if they were available? Who should, and can, provide leadership and support? Is an expectation of continuing support feasible, or are alternative support mechanisms needed? To what extent are such alternatives feasible?

1. "Information and Dissemination in Environmental Education: Recommendations". (John J. Padalino).

The first step in obtaining consensus for educational change to improve the global environment is to convince ourselves that the task must be accomplished. We must also convince our constituents, students, as well as their parents, that basic education at the local level includes communication, higher problem solving skills and environmental literacy - the thinking tools that allow us to comprehend the seriousness of the world's population, resources, and environmental problems.

Recommendations from the participants at the First National Congress for Environmental Education Futures: Policies & Practices, call for support for environmental education via a responsive electronic network, information and dissemination systems, dissemination to teachers, and the media. These recommendations echo similar statements made at previous national meetings focused on improving education on environment. This first EE Congress, August 83, was preceded by no less than eight national policy conferences that had been convened since 1970. These national convocations served as a valuable prelude for addressing environmental education policies and practices in America for the next decade.

The Alliance for Environmental Education (AEE), the organization that coordinated the Congress, has been nurturing the growth and influence of environmental educators in America longer than a decade. The AEE was founded during the early 70's among organizations of professionals with support from the Johnson Foundation. AEE affiliates now number 30 and represent diverse interests of youth, physical fitness enthusiasts, naturalists, educators, business and industry, labor unions and research institutions. AEE extends an invitation to provincial, regional, and state organizations, and their equivalents to affiliate with our network.

Coordinating this Congress was AEE's most recent contribution. The meeting became a forum for over 400 concerned professionals from 21 environmental organizations listening, discussing, and drafting ideas for a coalition of organizations to improve the quality of environment and education throughout America. Our educational opinion making and decision making has been characteriazed as diffuse and fragmented. Hence, it is recommended that practitioners in the environmental education community work together to analyze the decision/policy making process, monitor them and provide colleagues with technical assistance and information as needed. In order for us to be more effective to our colleagues we need information about:

> the current status of environmental education at the pre-college level - including statistical and descriptive information; latest policy, programs, and legislative developments at local, state, and national levels; list of available environmental education speakers and audio-visual materials;
>
> member organizations within the environmental education community - lists of their environmental education activities, experiences, and resources; school materials available for teachers.

There has been in the environmental education community an ongoing need for communication. My premise is that environmental education practitioners (school and community, local and state and regional) can, and want to assist each other and themselves in developing effective environmental education programs. To accomplish this our colleagues recommend that:

> "AEE initiate the development of a committee of researchers and evaluators from the environmental community to establish a responsive network through electronic data base which would include:
>
> -A director of researchers and evaluators in the field, their interest and their activities in process:
> Needs of researchers and evaluators as they pursue their activities:
> Recommendations (made by other researchers and evaluators, and by practitioners) for further research to help environmental education practioners do a better job."

In addition to researching and evaluating information, the expansion of current information and dissemination systems was recommended.

-An expanded information system should be devised, implemented and institutionalized for collecting, describing, indexing, and disseminating materials useful in environmental education training, research, and communication. This system should be designed by these currently involved with existing segments which should be incorporated into it, and should use existing intra-state centers.

These centers should be capable of collating, maintaining, and circulating information to the educational community. Local centers should also evaluate regionally produced materials for inclusion in this system.

This information should be developed by a central clearinghouse which would actively seek environmental materials produced by the public and private sectors. The clearinghouse should also coordinate the flow of information with the intra-state centers.

With regard to dissemination of information and technical assistance to teachers, Congress participants recommended to:

-Improve development and dissemination of environmental education information and materials to teachers and leaders. Participants stated that AEE should establish an ad hoc committee to develop a plan to review and report to the AEE Board of Directors on the status of recommendations not less than biannually. The plan is to include input from academic, resource agencies, state environmental education associations, and other interested colleagues.

In a focus on the media, Congress participants believed that the communication media remains one of our most powerful tools. They recommended that:

We need to continue to build sophistication in the use of existing and emerging media (1) to promote awareness and understanding of environmental issues, and (2) to promote environmental education in general and environmental education opportunities in particular.

From an analysis of these recommendations one may infer that there is evolving an expanding definition of "Information Dessemination" from one-way flow of information about results of research to an activist concept of using information to produce change. A viable example of this concept is the current Department of Education's National Diffusion Network. This model takes into account how environmental educators behave when they need assistance. Hopefully the results of our colleagues' recommendations will answer the

questions: To whom do environmental education practitioners turn when they need help? For what? How do we use the assistance? and What were its effects.?
Possible means of addressing our need to exchange information are:
directories - for stable information and data;
regular and timely newletters - for keeping up to date with developments in environmental education; and
instant exchanges - to inform environmental education practioners and policy makers of important news of immediate interest.

The information and dissemination recommendations of our colleagues at the Congress are relevant in terms of the needs of the field. They are sound in terms about what is known about delivery assistance.

In addition, they are feasible in terms of being implemented and maintained given the know-how and commitment of NAEE members and those of us in the environmental education community with kindred interests.

Complete proceedings of the Congress containing a set of thirty-six recommendations are available in a two-part report. The 172 page report documenting the policies track includes papers presented at the Congress, resolutions, and recommendations from interest groups. This part of the proceedings, entitled, The First National Congress for Environmental Education Futures: Policies & Practices, is available for $5.85 from SMEAC Reference Center, 1200 Chambers Road, Room 310, Columbus, Ohio 43212.

Of interest to practioners is the report of the practices track workshops held at the Congress containing practical helps in environmental education, from suggested teaching stratgies and student activities, to techniques for informing adults of the various action plans and practices related to environment. This part of the proceedings, "Reports of Workshops in Environmental Practices." was published as a special issue of the Journal of the American Nature Study Society, Nature Study, Vol. 37, Numbers 3 and 4, which can be purchased from ANSS, c/o John A. Gustafson, 5881 Cold Brook Road, Homer, New York 13077.

2. "Clearinghouse Functions for Environmental Education".
(John F. Disinger and Robert W. Howe, Director,
ERIC/SMEAC).

The Educational Resources Information Center (ERIC) is a decentralized information system which collects, abstracts, indexes, and disseminates printed materials in all areas of education. It does not include audio-visual materials or scientific/technical information; other data bases cover such materials. ERIC covers "fugitive" documents, announced and indexed monthly through Resources in Education (RIE), and journal papers and articles, announced and indexed monthly through Current Index to Journals in Education (CIJE). About 90 per cent of the RIE documents may be obtained from ERIC Document Reproduction Service (EDRS) in microfiche and/or paper copy; approximately 700 standing order customers around the world receive monthly shipments of all ERIC microfiche. ERIC provides no microfiche or paper copy backup for CIJE documents. Basic funding for ERIC system is from the National Institute of Education (NIE) of the U.S. Department of Education.

ERIC is computer-searchable by descriptors (key words), authors, and other search elements. Searches can be broadened or narrowed by use of combinations of search elements. Many standing order customers, and others, provide computer-search services, usually at a price. ERIC also may be searched on-line through several commercial vendors.

Each of ERIC's 16 clearinghouses have specific areas of responsibility; taken together, they "cover" all areas of education, with emphasis on "formal" (school-related) activity. Through September 1984, a total of 237,005 documents had been indexed for RIE, and 300,897 for CIJE. Of these, 7,129 carry the descriptor "environmental education," which another 3,000 or more are indexed under other environment-related terms.

The ERIC Clearinghouse for Science, Mathematics, and Environmental Education (ERIC/SMEAC) has had responsibility within the system for environmental education since 1971. Given the non-precise definitional nature of environmental education, many other ERIC clearinghouses routinely process documents of interest to environmental educators, using the same descriptors and procedures system-wide.

Each ERIC clearinghouse is charged with the responsibility of developing and maintaining contacts in its field, primarily in the United States but to some extent internationally, as part of its effort to access appropriate materials for the data base. Each clearinghouse also develops special publications, including information analysis products, monographs Information Bulletins, and Fact Sheets (Digests). Over the years, ERIC/SMEAC has published more that 90 such items in environmental education.

ERIC clearinghouses do not process all documents which come to them, even in their assigned areas. One constraint is budgetary; there is real cost associated with document processing, and more documents are received than can be budgeted for processing. Selection criteria include accuracy of content, qualities of literateness, potential for contributing to the field, availability, appropriateness to the data base, and reproducibility. On the basis of one or more of the above criteria, SMEAC rejects approximately 60 per cent of the documents which it receives.

SMEAC currently expends approximately $80,000 of its annual NIE budget of environmental education. Through cost-sharing, The Ohio State University contributes more than $25,000 annually in support of SMEAC's environmental education activities. Also, SMEAC spends more than $17,000 of its own funds, generated primarily from sales of publications, for environmental education. Also, SMEAC currently responds to more than 15,000 inquiries related to environmental education annually.

Among other existing data bases which index and abstract other useful materials are: National Center for Educational Media (NICEM), National Technical Information Service (NTIS), Dissertation Abstracts, Science Citations, Psychological Abstracts, and Agricola (U.S. Department of Agriculture). There are many others; most are computer-searchable. Back-up services (microfiche and/or paper copy) vary widely, but all provide information leading to sources of documents and other materials.

The above provides a summary of the current information-availability situation; in a word, the amount of information and resources existing and available is staggering. Looking to the future, it would seem counter-productive to initiate, from scratch, another entity to regenerate the environmental education services provided by existing data bases. The point is, of course, that much of what researchers and practitioners say they want is already available through one or more data bases; the basic problem is determining which data base is the proper one to search for specific needs. An additional problem is gaining access to the data base, then learning how to use it. A more insidious problem is in determining gaps--that is, what is it that is wanted that cannot be found from existing sources; then, how might that be found?

Two key factors needing consideration are linkages and sustainability. Much of what a "National Center" for environmental education, or anything else, should do is already being done by someone, somewhere; the above descriptions, sketchy as they are, suggests the depth of ERIC involvement and hints at other currently existing components. The major effort of a "National Center," then, should be in terms of linking existing efforts, capitalizing on existing resources, identifying gaps and determining how to fill them.

ERIC has been in existence for 18 years; it has dealt with environmental education, per se, since "environmental education" was recognized as a viable concern, and continues to do so. SMEAC has been in existence as long as ERIC, and has been involved with environmental education from the beginning of the ERIC system. The details of SMEAC's operation have changed with changing times and circumstances, but its mission is still there, accomplished within the constraints of the times. This would not have happened without cost-sharing on the part of Ohio State, or without the generation of local funds, primarily through sales of publications ("cost recovery," in effect, and in increasing percentages). If ERIC were not obligated to operate in a cost-recovery mode, SMEAC (and the other clearinghouses) could in fact provide the services which many seem to feel they should receive without cost. Based on numbers and types of requests received, SMEAC could in effect give away its current $700,000 inventory in about three months--but then would no longer exist, and thus would no longer provide services of any kind.

One of the ways that SMEAC has maintained its viability, at the same time increasing its services to a segment of the field, has been through the development and operation of an Instructional Resources Center for the Office of Water Program Operations of the U.S.

Environmental Protection Agency. Operating under a series of grants from EPA, SMEAC has developed a targeted data base dealing with water quality from an instructional point of view. This is the Water Quality Instructional Resources Information System (IRIS), also computer-searchable. As part of its arrangement with EPA, SMEAC also publishes a bi-monthly newsletter, for practitioners, and operates an audio-visual lending library, along with a paper-copy reproduction service for pertinent documents--training manuals and the like. SMEAC is in the process of becoming self-sustaining in this effort.

SMEAC and EPA Instructional Resources Center (IRC) activities have already demonstrated that many people, agencies, and institutions will pay a reasonable cost for some services and materials. Interaction with users and user surveys have been effective ways of determining these interests and needs. Services built on a planned cost-recovery program can be sustained and expanded in an incremental way; SMEAC and IRC have continued to increase their services and materials available every year.

ERIC, SMEAC, and IRC activities have also demonstrated that some needed services and activities cannot be provided on a dollar-for-dollar cost-recovery basis. Question-answering services require substantial personnel time, material support, and communication costs. These costs are significant, and more support, probably Federal and State, is needed to respond to these demands. Developing and maintaining an effective communication system to various publics with respect to environmental education needs, programs, materials, and other activities is also costly; it has not been fully developed. Additional funds are also needed to extend current developments of such a system and to provide resources for operating it.

SMEAC's activities of the past 18 years and analyses of other information dissemination and communication programs lead to two other observations.

1- Start-up costs are substantial in any program of this type, often equalling those of more than one year of actual operation. Many programs are initiated with funds for start-up and perhaps one year of operation; if they are not continued, the start-up costs are essentially lost and must be duplicated to re-start similar programs.

2- There is a lag time between (a) establishment of an information service and user awareness, and (b) user awareness and user use of the service. The duration of these "lags" depends on several variables, including the forms of communication used to provide user awareness, the types of information services available, the ease of use of the service, and the probability that the service will continue to exist. If any costs are involved in learning to use the service, the expectation of continued existence is particularly important.

It would seem that any plan for establishing a comprehensive environmental education information and materials clearinghouse must consider:

1- The avoidance of creating entities that duplicate existing services, especially if those services are continuing ones;
2- linking to existing activities particularly those which are long-term;
3- providing for incremental growth rather than extensive start-ups and re-starts;
4- providing for sustained operation, through a combination of cost-recovery mechanisms (which involves recognizing the costs associated with provision of servites and developing techniques for recovering them), and external support for some activities;
5-the long-term implications of any plan developed--how will it change the behavior patterns of people, what will be dropped by others in deference to the activities newly initiated, what will happen to those services if newly initiated activities cease to exist?
6- prioritization of needs, particularly needs of users; and
7- methods of demonstrating positive impacts.

V.F. Panel: "Toward a National Center for Environmental Education". PANEL CHAIR: John R. Paulk, Chief, Skills & Educational Development Branch, Division of Land & Economic Resources, Tennessee Valley Authority, 1835 Old City Hall Building, Knoxville, Tennessee 37902, USA. PANELISTS: Alexander J. Barton, Program Director, Office of Science & Engineering Personnel & Education, National Science Foundation, 1800 G. Street, NW, Washington, D.C. 20006, USA.; John J. Padalino, Director, Pocono Environmental Center, Route 1, Box 268, Dingmans Ferry, Pennsylvania 18328, USA..

Recommendation #1 of the First National Congress for Environmental Education Futures calls for an independent national center for environmental education to promote environmental education training, research, and communication. This recommendation echoes similar statements made at other meetings. The panelists will discuss the functions of a national center, the significance and impact such a center could have on the field of environmental education, current opportunities and constraints, and key strategies for development and support of the center.

1.- "National and Regional Centers for EE: Following up on the Recommendations of the First National Congress for Environmental Education Futures -Policies and Practices". (John J. Padalino).

From the reports of the National Commission on Excellence in Education, the Education Commission of the States, and in the wake of the plethora of studies on schooling in the United States, we learn that there is a crisis in education and something must be done. The environment, too, is in crisis. The quality of our life depends on the state of the earth's atmosphere, oceans and lands and our relationship to them. The classroom is the place where problems of education and environment must be met.

Those of us in the environmental education community have been saying this for some time. The First National Congress for Environmental Education Futures (August 1983) called attention to the common issues confronting environmental management and education. Both focus on future quality of life. The media, those who determine what receives the public's attention, are picking up these causes. Education and environment are again taking center stage. Now is the time for environmental educators to seize this opportunity to gain the attention of the nation. We must know what to do with this opportunity, what goals to pursue, and in effect how best to discharge our responsibility. At the EE Congress August '83 our constituents urged the Alliance for Environmental Education to seek major qualitative improvements in envirionmental education.

DIALOG AND ACTION

To nurture environmental education, the Alliance for Environmental Education has:

Sponsored national and regional conferences to exchange information on environmental issues.
Developed and promulgated guidelines for operating sound environmental education.
Advised the Federal government on its role in international conferences on the environment.
Represented the non-government sector in oversight hearings and implementation of the Environmental Education Act of 1970.

The members of the Alliance believe our highest priority is for professionals in environmental education to reach a firm consensus on concrete double measures and to mobilize our efforts to achieve them.

What measures? At the EE Congress our colleagues, in a unanimous resolution, asked the Alliance to work for an independent National Center for Environmental Education. This center would promote environmental education training, research, and communication. This request echoed similar statements made at previous national meetings.

The first recommendation that Congress participants made was:

> AN INDEPENDENT NATIONAL CENTER FOR ENVIRONMENTAL EDUCATION SHOULD BE ESTABLISHED THROUGH THE COORDINATING EFFORTS OF THE ALLIANCE FOR ENVIRONMENTAL EDUCATION, IN ORDER TO PROMOTE EE TRAINING, RESEARCH AND COMMUNICATION WHICH INVOLVES THE VARIOUS GROUPS CONCERNED WITH ENVIRONMENT...

This independent national center for environmental education would have its goals to:

- Promote cooperation and communication among professional organizations and associations, government agencies, business, labor, citizen groups, and the research and education communities.

- Serve as a clearinghouse and information dissemination center on environmental education, training and communication.
- Promote and participate in, and be supportive of local, national and international networks.
- Monitor and communicate progress and activity in EE, training, research and communication.
- Provide current status feedback to its network on achievements and needs.
- Undertake appropriate action (i.e., publications, programs, conferences, seminars, and legislation) to promote the development and implementation of EE training and communication locally, regionally, nationally and internationally.
- Assist in gaining financial and policy support of environmental education.
- Serve as a mechanism for public participation in understanding environmental decision-making.
- Serve as a referral center and repository for materials and information.
- Establish a communications network with teacher centers, state and local education systems, non-governmental organizations and business/industrial organizations involved in environmental education.
- Serve as a forum for environmental policy development, issues identification and educational strategies formulation.
- Conduct educational research, instructional materials development, testing and evaluation, and similar supportive activities for environmental education.
- Conduct teacher/youth-leader training activities in environmental education including the validation of programs developed by others.
- Encourage public accessibility to usable public and private land sites for environmental education activities.

Further, it was felt that the Center should give first priority to promoting and supporting the efforts of existing local, regional, national and international operations. Networking and catalytic action were identified as the Center's first order of effort. The Center should move to galvanize action and provide leadership to the environmentally concerned community.

The Center should have a core staff of full-time individuals from scientific, research, resource-based and representative Federal agencies, non-governmental organizations, state and local government, business and industry. Opportunities should also be afforded for part-time and/or short term staff participation as needed to conduct projects initiated by the Center.

The Center's personnel would need modern computing facilities and library retrieval services. Information compiled by the Center's personnel should be available in print form and through subscription by other computing and referencing systems.

Constraints that such a national center must deal with include:

A. A new organizational structure in addition to the Alliance for Environmental Educatio is being sought.

B. Implementation of this recommendation would stretch existing Alliance funds and would require new funds.

The Alliance president has called for the development of a position paper on the goals and vision of the National Center, a needs assessment, staffing requirements, policies and procedures, and a timeframe for establishing a National Center should the environmental education community deem it a doable measure.

The Alliance board is planning to convene a management team to investigate other successful centers and design a marketable management scheme, budget process, and evaluation instrument for a National Center for Environmental Education.

We are promoting discussion of the Independent National Center concept among governmental, educational and industrial leaders and other appropriate individuals who are in a position to support the plan either directly or through other sources.

Our goal is to formulate an achievable fiscal and operational plan for the initiation and maintenance of the National Center within the next year as we seek funding from private and public sources.

It is our intent to present a proposal to appropriate government offices and other associations and organizations.

The Alliance has accepted responsibility for exploring functions of a national center, the significance as well as the impact such a center could have on the field of environmental education, including current opportunities and constraints, as well as strategies for development and support of the center.

A national demonstration area and regional demonstration areas for environmental education should be established to:

- Demonstrate the involvement of all sectors of the American public in the education process.
- Demonstrate the economic, recreation and tourism benefits that can be associated with environmental education programs.
- Bring together in one location in each region, successful programs for demonstration, refinement and application.
- Provide an opportunity for scholars and practitioners to study applications and methods involved in environmental education.
- Demonstrate the interrelatedness of education, community, business and natural resources in environmental education programs.

A network of regional centers of environmental education should be established to:

- Act as a clearinghouse and information center in environmental education.

- Promote cooperation among environmental education associations, Federal government offices, citizen groups, youth organizations, and the scientific, research, and education communities.
- Provide referral service for environmental education consultations.
- Support and participate in an international network of environmental education centers.
- Monitor and report on the status of environmental education.
- Monitor and report on emerging issues in environmental education.
- Establish a communications network with teacher centers, state and local education systems, youth organizations, and non-governmental organizations involved in environmental education.
- Assist in planning for environmental education research and development.
- Serve as a referral center and repository for environmental education materials and information.

The EE Congress co-sponsors, too, are working on initiatives of environmental education, some national in scope and some at the grass roots. For example, the National Science Teachers Association established a Task Force for defining excellence in environmental education and charged it to develop a position paper defining "desired state" conditions for environmental education. A prominent state initiative for environmental education is occurring in Pennsylvania where two cabinet secretaries agree that environmental education is a top priority within the state. The Secretaries of Education and Environmental Resources established a 37-member task force to draft a master plan for environmental education for Pennsylvania by the end of this year.

The momentum will grow. John F. Kennedy charged, "Human resources and natural resources are inexorable, intertwined, and tomorrow's children, if they are to manage this land well, will need the precision of scientifically attuned minds, coupled with a sensitivity to their fellow men (and women) and creatures." Our approach to this challenge should be neither optimistic nor pessimistic. Neither unfounded optimism nor undue pessimism provides a firm basis for problem solving. Realism is more appropriate.

In the future, while consolidating past gains and assuring a strong environmental presence, the Alliance for Environmental Education is active nationwide. It:

- Provides materials and services which will promote environmental literacy among our citizenry.
- Plans national and affiliate strategies for environmental education for the next twenty years.
- Develops and promotes guidelines to help state and local officials meet the need for growth and development without disrupting delicate ecosystems.
- Attracts media interest in environmental concerns.

Let us build our consensus about the measures that are doable, while we have the attention of the nation and, together, get on with our task.

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VI.A. Backes, David. "The Air Ban War: Sigurd F. Olson and the Fight to Ban Airplanes from the Roadless Area of Minnesota's Superior National Forest". Department of Agricultural Journalism, University of Wisconsin, 440 Henry Mall, Madison, Wisconsin 53706, USA.

In the late 1930s, a handful of northeastern Minnesota pilots offered fly-in fishing trips into Superior National Forest's protected roadless area. Most conservationists paid little notice. They were busy expanding the boundaries of both the forest and roadless area, looking ahead to the day when the Quetico-Superior region could be managed as an International Peace Memorial Forest.

The Quetico-Superior, encompassing nearly 15,000 square miles along the Ontario-Minnesota border, was consindered the finest canoe country on the continent. The land had been carved by Ice Age glaciers. Its legends were carved by the Ojibway, Sioux, and several generations of fur traders known as "voyageurs." One could start near the small city of Ely, Minnesota, and travel by canoe through this vast labyrinth of jagged lakes and interconnecting rivers north to Hudson Bay, or northwest along Saskatchewan's Churchill River to Lake Athabasca, Great Bear Lake and the Arctic coast.

The first attempts to conserve the region began near the turn of the century, after the iron and steel trade had established a score of towns and the timber barons had cut the forest. In 1909, Canada created Quetico Provincial Park, and the United States established the adjacent Superior National Forest. The 1920s and 1930s marked successful battles against opening the canoe country to roads and hydropower development. Also, the U.S. Congress passed legislation to prevent shoreline logging, and President Franklin D. Roosevelt created the President's Quetico-Superior Committee to work with the U.S. and Canadian governments toward the establishment of an international wilderness area.

While expanding the Superior National Forest at the end of the 1930s, the Forest Service passed up opportunities to buy some of the many inholdings that dotted the roadless area. Meanwhile, the development of reliable small aircraft made possible a new kind of tourist trade -- fly-in fishing. People who owned land in the heart of the roadless area saw a golden opportunity, and began building fly-in resorts in the wilderness. Surrounded by federal land, with air travel the only easy access, they had built-in monopolies on their own sanctuaries.

The first two resorts were built in 1940, but the real boom began in 1945, as World War II drew to a close. Only a few conservationists had seen the possibility before the war, but now such groups as the President's Quetico-Superior Committee and the Izaaak Walton League sprang to action. They staged two national campaigns -- first, to get Congress to pass a bill authorizing Forest Service acquisition of the inholdings; second, to ban private planes from flying into the canoe country.

To get the acquisition bill passed, they needed to work out a form of compensation, agreeable to the local business community and county commissioners, for taking land off the tax rolls. But northeastern Minnesotans had grown to distrust all forms of outside control, due to years of sour relations with absentee-owned mining companies and down-state politicians, and they demanded more compensation than Congress would give.

Events in Canada made the bill's passage urgent. The only Canadian access to Quetico Park was a railway along its northern boundary. Consequently, nearly all of the park's visitors were American, outfitted by Minnesota residents. Businessmen from the small Ontario towns near the park complained that Minnesota resort owners were getting all the financial benefit and paying none of the upkeep. They pressed for access, and in 1946 officials opened several customs stations to encourage air travel into the park. Plans were made to lease cabin sites, and there were rumors of a road that would cut through the center of the park.

To American conservationists, such development meant the end of any chance for an international wilderness. The Quetico -- which was completely government-owned -- had always been held inviolate. But the Americans received little sympathy at first from officials of Ontario's Department of Lands and Forests, who said the United States should preserve its own side before expecting much of Canada. In the months ahead the official tone softened, and the Canadians promised to held back all development in the Quetico until October 1948, giving the Americans a chance to prove their sincerity by passing the acquisition bill.

Nearly all of 1947 passed without any progress in the compensation talks with local leaders, and the bill was tied up in Congress. The conservationists needed someone who could break the logjam in Congress and arouse public opinion against airplanes and resorts in the canoe country. They needed someone who knew the wilderness well and had contacts with supporters on both sides of the border. They turned to Sigurd F. Olson.

The 48-year-old Ely resident had participated in the fights against roads and dams, and was one of the few who had foreseen the airplane problem before the war. He had guided canoeists for over 20 years and knew the wilderness intimately. Educated at the University of Wisconsin and the University of Illinois, Olson had a master's degree in plant and animal ecology. He had recently resigned as dean of Ely's Junior College to devote full time to his life's desire -- writing about wilderness. Perhaps the one thing that meant more to him was the canoe country. Olson agreed to spearhead the fight, and began work in January 1948.

To meet Canada's deadline, the Americans had to get the acquisition bill passed during the next session of Congress. Olson generated national publicity through articles in The Christian Science Monitor, Sports Afield, Nature Magazine, American Forests and other publications. The President's Quetico-Superior Committee sent copies of his articles to newspapers throughout the Midwest and to outdoor writers across the country. Editorials in favor of the acquisition bill soon appeared, and letters poured in to Congress. Olson also worked to get the county commissioners behind a compensation plan that was agreeable to Congress. After a last-minute showdown he got their support, and the bill became law just before Congress adjourned for the summer.

The conservationists then put their full weight into the airplane fight. They pressed for an executive order from President Truman that would prevent private planes from landing in or flying less than 4,000 feet over the roadless area.

To have a chance of success, they needed a good show of local support. But in the small mining towns of northeastern Minnesota the issue divided families and broke friendships. This was especially evident in Ely. A handful of men who represented the airplane interests were attempting to gain political control of the town. One of their key strategies was to control the flow of information. They gained control of the Chamber of Commerce, the weekly newspaper and the radio station, and used these to spread rumors that played upon local fears of outside control. They also attempted to intimidate those who favored an airplane ban. A number of people received threats, and a bomb exploded in a canoe outfitter's backyard.

Olson helped generate local support through a 30-minute, color documentary film, "Wilderness Canoe Country." He wrote, directed and starred in the film, which was produced by the President's Quedtico-Superior Committee. By April 1949 -- three months after the film's debut -- 75 northeastern Minnesota civic groups had gone on record favoring the air ban, countering the opponents' claims that the area was united against it.

In addition to the film, Olson wrote articles for American and Canadian magazines, formed a Canadian Quetico-Superior Council to build support for the international wilderness, and worked in Washington to see that the airspace reservation request made it to President Truman's desk. Truman signed the reservation on Dec. 17, 1949. Local resort owners subsequently set up a court test, but the U.S. district and appeals courts ruled against them. The U.S. Supreme Court turned down their request for a final appeal in October 1953.

The airplane battle turned Olson from a junior college dean into an internationally-known leader of the wilderness preservation movement. During the next 30 years he served as president of the National Parks Association and The Wilderness Society, and as advisor to the Secretary of the Interior, participating in wilderness and national park battles all over the United States. It also gave new life to his dream of being a writer. His first book, The Singing Wilderness, was published in 1956, and quickly made the New York Times bestseller list. He wrote eight more before his death in January 1982.

The airplane battle's importance extended beyond the preservation of the canoe country. It demonstrated that two countries could work together to protect a common heritage. In the United States, it gave the Forest Service its first authority to buy land for purposes other than timber production or watershed protection. A U.S. President had taken unprecedented action to preserve a wilderness area, and the courts, in upholding his action, declared wilderness preservation a government purpose. Behind all of this was a groundswell of public opinion that focused national attention on the need for wilderness -- attention that continued to grow in the following decades and resulted in our national wilderness preservation system. As The New York Times said in an editorial praising the district court decision that upheld the air ban, the country had decided it could afford to preserve wilderness, that "the gift of tranquillity, wherever found, is beyond price."

VI.B. Cook, Don. "The Acid Raid Forecast: Moderate Precipitation, Visibility Limited". Associate Director, Acid Rain Project, Environmental Protection Agency, Washington, D.C., USA.

It is a pleasure to return to this group after a long absence to review some of the science and policy issues related to the acid deposition phenomenon. I have always considered NAEE to be the epitome of effective environmental learning in terms of teaching ecology, the human impacts on the environment and--most critically--the corrective steps needed to protect ecosystems and human health.

The fundamental barrier to a U.S policy on controlling the acid rain phenomenon is that proven damages due to acid deposition that can now be stated amount to only tens of millions of dollars, whereas many of the control strategies would cost tens of billions of dollars. The high cost of controls and the uncertainty of the science combine to make a consensus on a public policy difficult and illusive.

The hard evidence of acid rain damage in the U.S. is limited to 200 to 300 lakes that have been acidified and have lost their fish populations. This is equivalent to 2 to 3% of the surface water area of lakes solely in New York state. In the opinion of Jerald L. Schnoor, an aquatic effects specialist and professor of environmental engineering at the University of Iowa, the upper limit of lakes likely to be acidified in the U.S. is about 1000. However, they are among the most pristine and beautiful of lakes.

At present, EPA does not have a reliable estimate of overall damages. That information is being collected for the 1985 assessment of acid deposition effects, which will provide a physical inventory of the damages. Of the three categories of possible damages (aquatic, terrestrial and man-made materials), aquatic effects are probably of the lowest dollar magnitude.

The other two categories are more likely to be in the billions of dollars, if provable. Hard estimates of the damage to forests depend on more convincing evidence that the increased tree mortality and reduced annual growth now seen can be linked to acid deposition. For materials built in the human environment, the rates of deterioration of various exposed coatings and surfaces are under study and could be very large.

The major question on effects is: Have they peaked with the acidification of 200 to 300 lakes or is there much more bad news to be delivered. Many fear that the pattern seen in West German forests, where 34% of trees showed some damage in 1983 and 50% showed some damage in 1984, will be found in the U.S.

The struggle to forge an acid rain policy hinges on a handful of critical issues that we can briefly examine:

Safe Target Loadings: Usually stated in kilograms per hectare per, year, the target-loading measurement attempts to determine what level of deposition can be sustained without causing aquatic and terrestrial effects. The current discussion among scientists has centered on a level of 20 kilograms per hectare per year (equivalent to 18 pounds/acre/year) of wet sulfate deposition, but areas of the Adirondacks receive more than 40 kg per hectare per year. There is now little scientific certainty upon which to base a standard.

The Linearity of the Atmospheric Chemistry is another issue. The atmosphere can be viewed as a large-scale chemical reactor that cooks and cools pollutants in liquid, gaseous and solid particle forms. Although sulfur is widely believed to be the dominant component of acid compounds, the role of many other components may be critical. Ammonia, hydrogen peroxide, ozone and volatile organic compounds also are factors that may play important roles in determining the rate of conversion of pollutants to acid rain. One theory is that sulfur may not be the limiting chemical in the process. There may already be an excess of unconverted sulfur dioxide whose conversion to acid is limited only by the shortage of some catalytic trigger such as ozone or hydrogen peroxide. The implication of nonlinear chemistry is that a reduction in sulfur emissions may not result in a proportionate drop in acid deposition.

The issue of the importance of wet vs. dry deposition is another question. Since acidic compound are deposited in wet and dry forms, a control strategy needs to deal with both. Some scientists think wet material is perhaps half of total deposition; others say two thirds. However, the regular measurement of dry deposition on a regional scale is still in the developmental stage.

Still another question is whether the contaminants come from distant or nearby sources. Acidic compounds appear to be transported a long distance because they are detected in remote, previously pristine areas that lack nearby pollution sources at an intermediate distance (300 km) or a long range distance (1000 km) has been virtually impossible.

These and other persistent scientific uncertainties are a barrier to setting policy on acid rain with guaranteed results--something that politicians are looking for when considering costs as highas those required to build a second nation-wide interstate highway system or orbit a permanent space station.

Another thing the politician are confronting is a political fervor combined with an emotional tension that is strong and getting stronger. In the pollutant emitting states, the belief is: What's a little acid among friends, when we all enjoy the same benefits of tires, refrigerators and electricity from the Midwest? With a slight delay, we can avoid serious mistakes and cut costs, they believe.

But to Canada and New England, the issue is fairness. Forget the science--we have a right to be free of having acids dumped in our backyards. The Midwest must stop the effluvia now.

From my viewpoint, only two regulatory policies make sense now given the scientific uncertainties.

The first is the targeted emission reduction that EPA's Administrator William Ruckelshaus proposed to the Cabinet in September of 1983 but that failed to gain Administration support. The estimated cost of $2 billion to $3 billion is substantial but far less than that of most Congressional measures. The intent of this program is to concentrate emissions cuts in 10 or 12 states. This would address the linearity issue by establishing the rate at which sulfur deposition is decreased by cutting sulfur emissions in an area directly upwind from a target zone. It should improve areas that now have the greatest deposition levels and that also have lakes and forests at greatest risk, such as the Adirondacks. Even with an immediate decision to implement the targeted reduction approach, technologies such as flue-gas desulfurization or coal cleaning could not be put into place until 1990. Ruckleshaus has described this as a minimal insurance policy that we should adopt while the research continues.

A second measure that would help to bring about the targeted emission reduction and help the Federal deficit is a tax on fossil fuel combustion. The tax could take effect much sooner than 1990 and would have the benefit of promoting many of the non-hardware approaches to reducing emissions (fuel switching, fuel cleaning, turning the dirtiest plants on last and the early retirement of older facilities). The tax would also give an edge to solar and other renewable energy sources that cause little or no pollution.

The tax should be set at relatively low level for all fossil fuels but carry a surcharge for those that have sulfur. The sulfur charge should be progressive and should not apply to sources that already have reduced emissions below 1 pound of sulfur per million Btu.

The fuel tax could create a fund for use at a future date to help emitters of all acid forming compounds to install controls. If emerging research reveals that nitrogen oxides--for which only limited control technologies now exist--are a serious problem, the fund could be used to make research and construction grants for that technology.

The main benefit of a fossil fuel tax is that, immediately but gradually, it would tilt industry's practice away from using the highest polluting fuels without risking another "tall stack" type of mistake. (Up to the early 1970's, tall stacks were considered ideal for dispersing pollutants to safe levels. Now it appears that they inject sulfur at levels that increase the production of acid-forming compounds.) Several emerging technologies, such as the limestone injection multistage burner, hold the promise of providing relatively cheap pollution controls (about $40 per kilowatt hour of installed capacity vs. up to $280 per kwh for conventional flue-gas desulfurization).

Many of these technologies are costly, but U.S. science policy needs to assume that something like the forest decline of Central Europe and the aquatic damages in the Nordic countries will occur in North America--with the hope of being happily wrong. There is little chance that air pollution exposures that North American ecosystems now sustain will fall significantly in the next six to eight years. Some pollutants such as ozone and nitrogen oxides will increase. At present sulfur emissions in the U.S. amount to two thirds pound per person per day and nitrogen oxide emissions are at one third pound. These pollutant levels, while apparently tolerable to humans, may still be too hazardous for forests and lakes to maintain equilibrium.

The United States needs a greatly expanded and more comprehensive research program for ecosystems and environmental protection closer to the scale of research in the economic sectors of space, agriculture and health. Current year expenditures on acid deposition research are $55 million for the Federal program of which $36 million is for EPA. This research could easily be tripled and still not cover major uncertainties. This compares with a cost of up to $100 million for capital costs of sulfur removal at just one coal-fired power plant.

In 1903, Theodore Roosevelt said in dedicating Yosemite Valley as a National Park: "We are not building this country of ours for a day--it is to last through the ages." Only 81 years later, U.S. efforts to master the science of ecosystem damage are falling far short of that needed to protect major components of our national wealth.

Continental housekeeping and maintenance should be a first priority. Now as we approach 1992 and contemplate a permanently orbiting space station to commemorate the voyage of Columbus 500 years earlier, there is a disturbing point to ponder. While that space station may be orbiting over the continent he found for the Europeans, it may be circling over dying forests and lifeless waters. We have only about half a decade before projected nitrogen oxide and ozone levels in North America reach levels found in Central Europe today. The alarming fact is that knowledge of the trends, causes, effects, and corrective steps for forest decline, acid rain and lake acidification is at a point comparable to medicine at the turn of the century--few proven treatments are available.

No industrialized country or continent has reached a point in which its pollution controls have been brought into balance with what its ecosystems can bear. The U.S. and Canada have perhaps the best chance in the world to unravel the scientific questions. The other continents are either too politically diverse or ideologically resistant. Finding the right mix of controls that will correct the acid rain phenomenon is something we could do for the world and for humankind.

VI.C. Lanfried, Steven E. "Update from the Subcontinent: Efforts to Save the Siberian Crane". The Big House, Route One, Highway 59 East, Evansville, Wisconsin 53536, USA.

The continuing saga of the last 36 Siberian Cranes wintering in the Indian Subcontinent has a new chapter.

Efforts to save this remnant flock from extinction were given renewed hope by recently implemented legislation in northern Pakistan and new research proposals in India. These major breakthroughs are largely the fruits of a multidimensional four year program of environmental education detailed by my 1983 NAEE keynote address in Yspilanti.

The new laws in the Northwest Frontier Province are designed to protect Siberian Cranes and two other crane species as well. Baluchistan, the NWFP's neighboring province to the west, has stepped up its attempts to prohibit border crossings by crane hunters from the NWFP bound for remote areas of that province. Both provinces joined with Sind Province in outlawing the hunting of Siberian Cranes.

Siberian Cranes transit these provinces along as yet undiscovered seasonal migration routes between resting areas at Lake Abi-Estada in Afghanistan and wintering grounds at the Keoladeo Natural Park in Bharatpur, India. Likely migration paths take them through crane hunting areas in Pakistan.

The suspected pressure on Siberian Cranes is a result of the live catching and shooting of more numerous Demoiselle and Common Cranes by an estimated 2,000 Pathan tribesmen who practice the sport in northern Pakistan. These hunters catch their prey by throwing lead-weighted cords over the long, outstretched wings of descending cranes lured toward them at night by caged decoy cranes. Between 1,500-2,500 cranes are live caught yearly in this manner. (Uncaged decoy cranes are also used by Pathans in Afghanistan to lure migrating cranes toward hunters who shoot the birds rather than catch them. Unfortunately, the unrest in Afghanistan has made research on the magnitude of crane hunting there virtually impossible.)

Announced on February 28, 1983 by provincial governor, Lt. General Fazle Haq, the new crane protection laws in the NWFP area significant step for conservation in Pakistan generally. Tom Roberts, a distinguished British naturalist and longtime resident of Pakistan, feels the developments are "very important because it is such a tough problem involving long term education to change attitudes."

The new laws were carefully drafted. For the first time in the NWFP, crane hunters are required to obtain hunting licenses to pursue their sport. Because of the impossibility of licensing individual hunters in the remote areas involved, licenses are sold to crane camps. Camp hunting fees for the spring are 1,000 rupees; half that in the fall. The differential in fees is intended to create financial disincentives for spring hunting and to provide an educational tool to impress hunters with the importance of allowing the cranes to successfully migrate to breeding grounds to replenish their dwindling numbers.

In order to discourage hunters from exporting their sport any further, the new laws impose a tax of Rs. 500 for each crane transported out of the province. Lest hunters be tempted to cross into neighboring Afghanistan (only fifty miles away), a fee of Rs. 2,000 will be assessed for cranes exported out of the country. Commercial crane trade within Pakistan is outlawed; as is the use of firearms for crane hunting.

Thoughtful environmental action involves careful planning. In this case, the timing of publicity regarding the new crane hunting legislation was of strategic importance. According to Mumtaz Malik, Chief Conservator of Wildlife in the NWFP, "the new crane hunting restrictions were purposely announced at the last minute so hunters could not organize before the commencement of the crane hunting season. By the time it was clear the laws would be enforced, the hunting season was half over and many camps did not go out." As a result, Malik estimates that "hunting was reduced in the spring by at least one-half."

Practical political strategies must be balanced with other realities. Experience indicates that the effectiveness of new hunting regulations in developing countries, or developed countries for that matter, improves when hunters are given incentives to cooperate with conservation measures. Recognizing this, the new laws waive crane possession fees for the lifetime of any crane produced in captivity. In addition, each hunter who provides a healthy freshly caught crane to NWFP wildlife staff for color banding and release back into the wild (for crane migration studies) will receive a two year waiver of possession fees for one of his captive cranes. In addition to providing incentives to hunters, it is hoped these provisions will also help reduce the depletion of the wild flocks.

The laws are an outgrowth of educational and lobbying efforts with conservationists, top governmental officials, forest and wildlife departments initiated by this author in December, 1981. They are also a result of studies of the crane catching in March and April, 1983. Research was conducted by provincial wildlife departments in cooperation with the World Wildlife Fund-Pakistan, the Pakistan Forest Institute, and the Special Foreign Currency Program of the U.S. Fish & Wildlife Service.

Legislative wildlife protection is only as good as the degree to which a broad spectrum of people affected by the laws understand and support them. As a result, broadly based educational activities have been initiated in Pakistan to bolster support for the new legislation. These include briefings for key national, provincial, and local officials ultimately responsible for enforcement of the laws; educational programs conducted in the field for friends and relatives of prominent crane hunters; training sessions for wildlife staff; and wide-spread publicity of the program and its goals. Not surprisingly, some sophistication has been required in tailoring messages for differences in the perspectives and educational level of these and other target audiences.

Tom Roberts is enthusiastic about developments. He feels Pakistan has taken "a step forward from which there won't be a full retreat. The hunting will go on for some time but you've got all the top government officials in the Frontier, including the governor and chief secretary, conscious of the problem in a way they never were before." Furthermore, Roberts believes that important long-term spin-off benefits from the project may have nothing to do with cranes: "If you can make progress here, you will automatically open a lot of other gates. It's really a pilot project in getting at grass roots conservation in Pakistan."

In India, too, progress is being made. Effective counts of Sarus Cranes at Keoladeo National Park in Bharatpur in April, 1983 and 1984, have increased the awareness of crucial importance of the sanctuary for the survival of the Siberian Crane. Organized by the local natural history group, the crane counts brought scientists from the Bombay Natural Society, park staff, professors and students of a nearby college together for the first time to learn about cranes, wetlands, and protection of the environment. The possibility of expanding crane counts elsewhere in Rajasthan and to other Indian states is under consideration.

More importantly, a high level meeting was convened in New Delhi in August to discuss the feasibility of a ground survey of possible Siberian Crane stop-over places in India. The scientific and political wisdom of capturing a few Siberian Cranes for radio-telemetry tracking was also raised. Participating in the discussions were chief conservators of wildlife from the five northern states through which Siberian Cranes may migrate. Plans are now on the drawing board for a ground survey during the spring 1985 migration. Discussions of a sister project have occured in Pakistan. In each case, the goal is to piggy-back research and educational activities by enlisting the participation of diverse groups in the project.

Meanwhile, a flow of press releases, newspaper articles, radio and television reports in local and regional dialects, and the release of Siberian Crane stamps have increased awareness of the plight of the bird at all levels of society in both countries. Several wildlife organizations, including the International Council for Bird Preservation, have funded the development of an audio-visual program designed to strengthen these efforts. The slide show will be released by national organizations of the World Wildlife Fund in India, Pakistan, and Nepal in Urdu, Hindi, and/or English to maximize its effectiveness.

Many challenges lie ahead. Sustaining interest in the project is absolutely essential. This is no small order in an area bereft with political, economic, and bureaucratic problems. (Author's note: a case in point is the death of Indira Gandhi which has put Siberian Crane ground survey and radiotagging proposals on temporary hold.) Intensive population pressures in the area have obviously onerous economic and environmental implications. Longstanding hostilities between Pakistan and its neighbors to the north and south further complicate the situation.

Broadening the thin ranks of the conservation infrastructure is another major challenge, particularyly in Pakistan. Because wildlife has traditionally been relegated to appendage status under the forest department there, the curriculum at the Pakistan Forest Institute finds wildlife as only one-half of one of the 36 courses required for a baccalaureate degree in forestry. The lack of any degree program in wildlife management in Pakistan means that no more than a handful of people have received extensive training in wildlife management. These individuals are widely dispersed throughout the country and several key persons are at or near retirement age. A clear need exists to send environmentally sensitive people overseas for training, but, ironically, this sometimes requires that fledgling programs are left to less competent staff with neither the expertise nor the interest to keep them afloat until the person returns to the country.

Development of environmental conscientiousness has another paradoxical effect: awareness of one problem invariably leads to awareness of other problems. In this case, cranes provided an opportunity for individuals to express concerns about environmental problems in other areas. Ensuing contacts often find outside expertise and resources being drawn in those directions. Whether the crane project will retain its current priority remains to be seen.

Whatever the case, however, there is something to be said for the old addage about one hand washing the other. Consciousness raising and institution building are slow processes and a multiplier effect can develop which necessitate temporary reallocation of resources to other projects. At the same time, it is important to recognize the need to nurture projects along until enough interest is generated in them to allow them to stand on their own.

In the meantime, the Siberian Crane's brush with extinction can serve as a lighthouse to draw peoples' attention to more fundamental environmental issues. In a real sense, the cranes serve as nature's barometers; as an early warning system about the status of wetlands along their international migratory paths. Studying and trying to protect them teaches us much about man and his abuse of their wetland homes--and the forests on which many wetlands ultimately depend. Experience with this project also provides insights into the intricate social context in which environmental action occurs-- and the importance of recognizing that future success depends on our ability to consistently reach diverse target audiences with effective conservation messages.

Developments of the last year offer hope for the future of the Common and Demoiselle Cranes, if not for the Siberian Crane. At the same time, they remind us how fragile and sensitive our efforts are to the whims of fate and the accumulated effects of man's unthinking exploitation of increasingly scarce natural resources. Persistence provides many lessons, ideas for more effective strategies for constructive action . . . and few guarantees.

VI.D. McClaren, Milton. "Mediating the Unthinkable -- Discussing the Problem of Nuclear Arms with Students". Faculty of Education, Simon Fraser University, Burnaby, British Columbia V5A 1S6, Canada.

This is an era when many people feel as if they are living under the constant threat of nuclear conflict. For adolescents, these feelings are often translated into a syndrome of hopelesseness, apathy, and futility. Many adults, teachers and parents alike, feel unable to negotiate with adolescents to help them deal with these feelings. Assurances that, "Everything will be alright"' are not helpful and silence may be taken as affirmation that the situation is hopeless and that nuclear devastation is inevitable.

This presentation explored some avenues by which adults may mediate the issue of nuclear arms and the threat of global catastrophe in ways which neither ignore the seriousness of the problems, nor surrender to a blind fatalism while consigning total responsibility for finding a solution to someone else. The paper developed a definition of the mediation process in terms broadly related to the field of "Problem Solving", and proposed that while the problems of the arms race, nuclear arms, and war in general are grave, they are also worthy of our best critical and creative thinking. To engage in this we need to learn how to gather information, to evaluate sources and arguments, to recognize bias, dogma, propaganda, and to attempt to create a new vision of a peaceful world, as well as of the processes which might create it.

In the paper, war *per se*, was seen as a generic human problem. One of the unfortunate side effects of our concern for nuclear war is that other forms of international and denominational armed conflict have been "trivialized" because they don't seem to have the planetary consequences of nuclear war. We also need to learn to develop empathy for people whose lives have been devastated in "brushfire" wars or in "police actions" and to learn to think about avenues for the resolution of conflict which does not entail the exchange of arms and the death of humans.

The focus of the presentation was on the proposition the "vision" and "invention" are coupled to objectives and effort in the resolution of any problem. Humans need to "re-vision" their ideas about conflict, victory, security, and defence in an era of biocidal and planetocidal weapons. Teaching strategies and resource materials were explored, as well as ways of avoiding political and ideological polarization.

VI.E. McKone, Thomas E. "Tracking the Global Fate of Toxic Elements from Energy Systems". Staff Scientist, University of California, Lawrence Livermore National Laboratory, 761 Pine Street, Livermore, California 94550, USA.

All energy systems involve alterations of the geochemistry of a local, regional or global environment. Much of the recent literature on the environmental problems associated with carbon fuels has focused on two outstanding aspects: the increasing concentration of carbon dioxide in the atmosphere, and acid precipitation. However, there is a third aspect that is receiving increasing attention and is the focus of this paper. This issue involves the increased mobilization by fossil fuel cycles of toxic elements from the earth's crust to the surface environment. The paper addressed some ways in which energy production can alter the chemical cycles of toxic elements within natural systems. Particular attention is given to methods for visualizing and teaching about environmental chemistry. The "landscape prism" is presented as a tool for representing the earth's surface environment in terms of the important systems through which mass and chemical exchange occur. These systems include the atmosphere, the hydrosphere, the biosphere, soil and rock as well as industrial societies. Particular consideration is given to how large-scale combustion of coal in this century has disturbed the quasi-equilibrium of trace elements in the environment and to the likely consequences for human health. The role of the increasing global acidity in rain is considered as a change that could further intensify the mobilization of toxic elements in our environment.

The components of the earth's surface are linked by chemical cycles to form a system in which there is chemical balance. Each element has an "environmental chemical cycle," which can be mapped in terms of local, regional, or global fluxes. The chemical cycle of most elements begins in the crystalline rock that is at the base of the upper crust. Groundwater dissolution, erosion, uplift, and volcanoes transfer elements from this zone to the surface environment. At the surface, elements are distributed among sediments, soils, flora, fauna, rivers, lakes, and oceans. These cycles provide chemical stock for the biosphere including humans. The ancient Greeks first noted that overall health is influenced by the chemistry of the environment. In Air, Water, and Places Hippocrates demonstrates that the well-being of individuals is influenced by quality of air, water, and food; the topography of the land; and general living habits. For this paper the methods of "environmental geochemistry" provide the tool for mapping element cycles in landscape.

The calculation of element distributions within environmental compartments is composed of five steps. First, one constructs the landscape prism. The landscape prism is a visual tool used in environmental geochemistry to illustrate the flow of elements in the earth's near-surface environment. Second, the landscape prism is divided into a set of compartments consistent with patterns of element circulation observed in the global environment. Third, for each element, transfer coefficients between each set of compartments are determined. General geochemical data are used to calculate transfer coefficients for the landscape systems model. Fourth, these transfer coefficients are used to set-up a system of first-order, ordinary differential equations that define the time-dependent distribution of chemical elements in the landscape. This set of equations is solved numerically.

Studies on coal fly ash indicate that it is enriched relative to the crust in several elements including the toxic species arsenic, lead, mercury, and radium. This paper examines some potential health and environmental effects of changing the surface abundance of these species at regional and global scales. Such geochemical mobilizations must be analyzed in a way that integrates knowledge from several disciplines. Using the models described above, average environmental concentrations in air, water, and food are derived and translated into a collective population exposure expressed as daily intake. The collective population dose is converted to population risk, which is expressed as lifetime cancer risk per individual for carcinogens and as a range of blood levels for other toxins..

The overall analysis is used to investigate and rank the impact of additions of arsenic, lead, uranium ore, uranium-238, and radium-226 to the groundwater and soil of generic landscape. The toxic rank is obtained by determining the steady-state flux of a given species required to equal the population risk of 1 g/km^2 per year of radium-226 similarly introduced. The results provide a rough measure of the quantity of a toxin such as arsenic that provides the equivalent detriment of a unit quantity of radium. The basis of comparison is the steady-state change of population health risk within a physical region, such as a river basin, as a result of a continuous source. It is found that, when one considers environmental chemical cycles, the hazard ranking of these species fails to correlate with tradional measures of toxic hazard that are derived using drinking water standards.

This process of assessing chemical cycles and the impact on human health has been incorporated into a computer program called "GEOTOX", which is being modified for use on personal computers (PCs). The PC version of this program is intended for use as a screening tool for regulatory agencies. Nonetheless, it also offers the potential for use as a tool in classroom demonstrations or for individual research at the college level.

VI.F. McNeil, Richard J. International Environmental Issues: Teaching at the University Level. Assoc. Prof. of Natural Resources, Dept. of Natural Resources, Fernow Hall, Cornell University, Ithaca, New York 14853, USA.

A very large proportion of critical environmental issues are international in their causes, effects and solutions, especially if we include secondary effects. A course on international environmental issues, using foreign and international case studies, provides good illustrations of concepts, problems, and solutions applicable to domestic situations. The background provided is useful for many kinds of international and foreign careers and for domestic activities which have foreign aspects. Finally, to be a good citizen today, a deeper understanding of the complexities and interrelatedness of these issues is essential.

ESSENTIALS OF A COURSE

Concepts

I make concepts central and facts secondary to my teaching methodology. Novak and Gowin (1984) present an excellent argument for stressing concepts (which, of course, are abstractions and must be illustrated with facts and case studies).

It is important to minimize the number of concepts dealt with by including only those which are fundamental, or critical to understanding behaviors related to the course, of great explanatory power, misunderstood or neglected.

Issues, policy and management

A normal sequence of events occurs in resource management. A phenomenon appears and is perceived; a problem is defined; if the problem is not solved and becomes interesting publicly, an issue arises; a policy decision is made; management occurs (modified from Caldwell 1984).

An understanding of this sequence is fundamental to teaching a course on international environmental issues. It becomes easy to see that perceiving phenomena is difficult, that public interest about a problem grows slowly and unevenly and therefore that issues arise slowly. Discussions of policy-making in an international arena then flow easily from case studies of problems and issues.

Policy decisions are, of course, almost always difficult. Besides the questions surrounding such decisions themselves, an international course must examine the extra problems related to the process of decision-making. The Law of the Sea Treaty and the developing debate over Antarctica provide outstanding demonstrations of both the vexing policy questions and the difficulties of finding suitable processes for reaching decisions.

Which issues are significant? Which are critical?

Caldwell (1984) defines intrinsic significance as "the ultimate importance of an issue for the welfare or survival of human society." He says that political significance is seldom determined by intrinsic significance. Too many other political considerations (Caldwell includes "perceived public preferences, the state of the economy, military security . . . and implications for the personal fortunes of the policymakers") enter into setting priorities. And so, snail darters and furbish louseworts get a large measure of attention while hundreds of tropical species dwindle to extinction. We work out methods of artificial resuscitation for sea turtles while erosion carries away millions of tons of topsoil.

Some issues are critical. Immediate action is necessary if a problem is to be averted or alleviated. It may be a useful exercise to ask students to create (spontaneously, without reference to outside sources) a ranked list of intrinsically significant and critical international environmental issues. A short discussion will reveal their interrelatedness and will raise students' consciousness regarding significance and criticality.

Which significant or critical problems are not usually perceived as issues?

It is important for students to understand that some fundamental problems, mostly not 'environmental' in a narrow sense, are not generally seen as issues and yet are basic causative or confounding agents in other problems and issues. These tend to be deeper, less susceptible to management, perhaps representing 'the human condition,' and include, for example, human greed, misuse and uneven distribution of power and wealth, political instability, lack of political will, inability of insufficient capacity of socio-political systems to respond, and rapid rate of change.

What mechanisms are available for the creation and execution of policy?

Students must understand the kinds of institutions -- commissions, governments, international quasi-governmental organizations, private groups (including lobbies and transnational corporations) --that create and execute international environmental policy. Learning about specific institutions is only of secondary value; only the few most prominent examples of various types should be examined. Also, the tremendous power of multinational corporations can be illustrated by various cases and readings.

Similarly, the major types of instruments -- laws, treaties, agreements, conventions -- should be examined but with only a few examples receiving any prominent attention. Many pivotal conferences, statements, and programs could also be examined.

A discussion of enforcement of agreements is usually instructive. The power, or lack of power, of the International Court of Justice (World Court) often leaves students feeling helpless until a deeper discussion reveals that power available in public opinion, economic boycotts, international prestige and similar social tools and mechanisms.

Values, attitudes and world views

In the classroom I try to make a few of my attitudes and values explicit because a) I think they can set a good example, b) students can better understand my rationale, objectives, choice of case studies and other ways I influence the course content, and c) discussion of attitudes and values helps to explain differences between cultures and to point out some sources of conflicts in policy decision-making.

Among the values I bring to the discussion are: a sense of obligation, especially but not only to human beings and other living things, present and future; a belief in the need for movement toward sustainability, toward sufficiency, toward equitability; an assumption that progress is possible.

Attitudes I find especially useful include optimism, hope, concern, a sense of urgency, acceptance of uncertainty and change, ability to cope with the realization that some problems have so (short-term) solutions.

I begin and end my course with an extended discussion of the meaning of the word 'development.' I find that values and attitudes come forth easily; at the end of the semester students have become much more sophisticated in their understanding.

Different world views can affect behavior markedly; resource management decisions are quite different for example in fatalistic cultures, those which believe in reincarnation, those which believe in progress, those which believe in the concept of limited good. Slight differences can usually be accommodated; radical ones may or may not be compatible. Even distinctly different views can be accommodated if, for example, laws are accepted as valid arbitors of behavior.

METHODS

Concept mapping and use of case studies are central to my teaching methods. Concept mapping organizes my thinking and teaching, assists student learning, and ensures that student and teacher have reached "shared meaning" (Novak & Gowin 1984). Case studies provide concrete illustrations of abstract concepts.

With complex subject matter a discussion format is essential. I also require a lengthy (20-30 page) term paper which is analytical, issue-centered, and offers proposals to resolve problems. I use essay examinations and find that most students prefer those which they can take home or, if done in class, which have pre-announced subjects or questions.

I have used extensive readings from a variety of sources, and a required text, by Caldwell (1984). I believe that an understanding of the recent historical setting of current environmental issues is valuable. Caldwell does that very well, and includes appendices listing international organization, programs and events of significance for protection of the biosphere.

THE CONTEXT SURROUNDING A COURSE

Courses do not exist in isolation. They are parts of curricula. More than that, they are immersed in an environment (which they help to create and modify). A small collection of relevant books and a steady flow of journals and daily newspapers is essential. I have found the following journals to be especially valuable: Ambio, Biological Conservation, Ceres, Development Forum, Environmental Conservation, IUCN Bulletin, Mazingira, UNESCO Courier. Films, videotapes and similar aids are useful, especially for setting a scene or mood, for cheap surrogate visits to foreign regions, and for certain examples and case studies. Access to such materials is easy; also visiting scholars from other regions are available in any large community or school. Other faculty members, other students, other courses, and related programs such as semester- or year-abroad courses can greatly strengthen international curriculum efforts.

A curriculum can be part of a program, which may involve research, faculty colleagues, and interaction with related departments. Such a program, in my opinion, needs several elements. These include self-improvement (including travel, extensive reading, contacts with collegues elsewhere with similar interests), networking (i.e. building up a set of relationships with interested scholars, government officials, members of organizations, foreign students), and administrative support (both financial and emotional) at all levels. A final requirement is to assist colleagues to grow, through discussions, literature, seminars, and other means.

Courses, curricula, and programs are always imperfect but those targeted toward international perspectives have a special probability of becoming functional, valuable, and pleasurable teaching-learning experiences.

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VI.G. Ottum, Margaret G. "Education's Role in Toxic Waste Control". Associate Professor, Department of Environmental and Health Sciences, Johnson State College, Johnson, Vermont 05656, USA.

Toxic wastes are a byproduct of the modern industrial society and how a nation handles them is a measure of its commitment not only to its current population, but also to all future generations and the world at large. The U.S. Environmental Protection Agency (EPA) in 1980 estimated the U.S. generated over 58 million metric tons of hazardous wastes a year and that the quantity was increasing by 3 to 5 percent per year (EPA, 1980). Unfortunately many of these dangerous wastes that have been produced and subsequently "thrown away" have surfaced again at places like Love Canal, Valley of the Drums, Times Beach, Chemical Control and many many more.

EPA (1980) has on file many hundreds of documented cases of damage to life and the environment resulting from the imnproper management of hazardous wastes and the list is growing - and the list will continue to grow as it is estimated that 90 percent of all hazardous wastes have been disposed of in unsafe ways.

Hazardous wastes are produced by many industries including paper, metals, machinery, stone, glass, and so forth, but the largest single contributor is the chemical and allied products industry. This is a broad industrial category, that includes the producers of such things as detergents, cosmetics, paints, plastics, synthetics, fertilizers, and pesticides. Collectively they generate about 60 percent of the hazardous wastes produced and some of the most difficult to deal with.

Hazardous substances have been with us since historic time but the nature of the substances and the magnitude of the problems they present has changed markedly in the last 40 years. World War II might be viewed as the birth of the "Chemical Age", for it is largely since then that America has been transformed from a nation of natural substances to one of synthetics. By the 1970s, there were an estimated 70,000 chemical substances in the marketplace and about a thousand new ones were being introduced each year. At the birth of the chemical age many big questions were overlooked as attention was focused on the role of these new chemicals in protecting, prolonging, and enhancing life. The enjoymnent of new synthetics, plastics, and pesticides was not marred by fear, because few realized that risks might also be associated with them. Even the scientific community's interest and concern over these new chemicals was limited and sporadic until the publication of Rachel Carson's Silent Spring (1962).

By then thousands of chemicals had already been produced and very few had been adequately tested. Even when testing had been done, little was known about long-term effects or how substances responded when combined. Unwittingly America was becoming a laboratory for chemical testing but few Americans recognized the dangers.

Also few recognized that the wastes produced by this growing industry needed special care and handling. Most of the wastes produced were in the form of liquids and sludges and most of those were going into unlined waste ponds and lagoons or being dumped into landfills. In most cases no attention was paid to site locations, safety measures, or the maintenance of records.

This has led to a hazardous waste legacy that is national in scope and almost beyond comprehension in size.

> It has been estimated that there are between 32,000 and 50,000 landfill sites that contain hazardous wastes and that probably 2,000 of these pose an imminent danger to public health and the environment (U.S. EPA, 1979).
>
> A surface impoundment assessment funded by EPA and conducted by the state in 1980 identified 176,647 industrial lagoons and other waste impoundments. A preliminary investigation of 8,163 of them found that 70 percent had no lining and 95 percent had no monitoring system (U.S. EPA, 1980).
>
> EPA estimated in 1980 that there were more than 400,000 wells into which liquid wastes were injected and that each year about 5,000 more were dug (EPA, 1980).

In 1976 Congress confronted with overwhelming evidence that the improper disposal of huge quantities of hazardous waste was endangering millions of Americans, passed the Resource Conservation and Recovery Act (1976). This act was designed to impose "cradle to grave" control over the treatment, storage, transportation and disposal of hazardous wastes which have adverse effects on health (RCRA, 1976). The goal was to assure safe and tightly controlled handling and disposal of all newly created hazardous wastes.

Congress, four years later (1980), enacted legislation creating a "Superfund" designed to provide money for the cleanup of abandoned dump sites and toxic spills (Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 1980).

The law imposed a tax on chemical producers, with the money placed in a fund to be used if and when the parties responsible for the toxic dump or spill could not be located or could not be compelled to rectify the problem (CERCLA, 1980).

So far the implementation action regarding either of these pieces of legislation has not been good (National Wildlife Federation, 1980). There were delays by EPA in promulgating regulations, suspension of implementation, rule changes, charges of fraud and mismanagement, and above all, lack of enforcement. The results have not only been an increased risk to public health, but also an increased lack of credibility on the part of EPA. This quickly translated in the public's perception to a distrust of the government's interest and sincerity in protecting their health and safety.

Currently, one of the major problems facing the industries that produce hazardous waste, the state governments, and the public at large is the lack of good disposal facilities. A considerable number of treatment and disposal options are available but in each case they require the siting of a facility and this has become extremely difficult and in some cases impossible due to public opposition.

When legitimate waste disposal at a reasonable cost is unavailable, the illegal hauler or "midnight dumper" often becomes a major element in the hazardous waste picture. These "dumpers" dispose of wastes at night wherever it is most convenient and often at a fraction of the cost required for legitimate disposal.

As a result, such hazardous wastes have gone into streams, ponds, lakes, down storm drains and mine shafts, been spread on farms and roadways, left in vacant lots, and even in city streets. It has also been mixed with heating oil and sold in cities, mixed with oil and spread on gravel roads, or even mixed with asphalt and used to surface roads.

These practices have resulted in environmental damage, adverse health effects, and enormous cleanup costs. The huge profits involved with this type of disposal and the low penalties when apprehended have encouraged such practices and also made this a lucrative "business" for organized crime (New York State Senate Select Committee on Crime., 1980).

Breaking the past cycle of irresponsible disposal practices will be a monumental task. It must involve strong control and cleanup legislation but also must involve education. For only through an informed and educated public is it possible to stop the current practices - let alone rectify the past mistakes.

Education must:

Promote the idea of limiting the amount of hazardous wastes produced, and substituting less dangerous substances, be it on the small scale of the home or the large scale of the country.

Promote recycling and re-use not only of bottles, cans, and oil, but also a myriad of other substances.

Promote the utmost care and the safest possible disposal methods for the toxics that must be produced.

Provide us with the tools to exert pressure on elected officials and government agencies to develop incentives for industry to produce less and for government to impose strict and stringent penalties for those that do not.

Instill a commitment to responsible action.

It may cost us all a little more for the products bought, but that is a small price to pay compared to the long-term risks associated with any other action.

The cost of clean up is far more expensive than proper disposal in the first place. Typically, costs just for determining groundwater quality at an industrial waste disposal site have been estimated to range from $50,000 to $250,000 and the total cost of clean up at such a site to be in the millions. EPA itself estimated that the cost of remedying the most severe toxic waste problems in the U.S. may be $50 billion and that does not include the social costs.

Hopefully we can and will break with the past practices of dumping wastes wherever it is cheapest and easiest.

Hopefully we will make a genuine effort to rectify past mistakes.

Hopefully we will use our technology to provide a better life and will not allow its byproducts to threaten our very existence.

Hopefully toxic wastes will not be one of the major legacies that we leave for future generations.

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MY VIEWS ABOUT THE ENVIRONMENT

It is appropriate to state some of my personal beliefs, based on a long experience with industry. I think that they are shared by many in the private sector.

1) The environment is what is all around us and where everything happens. Where it all happens is not just air, land and water, but all of nature. The entire globe is involved in environmental considerations that transcend all boundaries and jurisdictions.

2) The environment is defined more formally as the surrounding conditions, and the influences or forces which influence or modify them. Within this context there is a host of physical, biological, physio-social, bio-social and psycho-social factors. Therefore, the term environment encompasses every aspect of life and living, every aspect of nature.

3) The environment undergoes and adjusts to constant change because of natural phenomena. Man has added to these changes because of his own activities. He has overgrazed pastures, cleared steep slopes, blocked rivers, over-farmed land,

over-killed wildlife, felled too many trees, built roads and communities, drained swamps, and has surface and underground mined to recover many commodities of great value to our way of life.

4) In the past relatively little concern was given to the impact of man's actions upon the environment. Man probably had the erroneous idea that he was put on earth to dominate nature, and to do whatever he chose with it. But, in recent years, many people have insisted that we become aware of air and water pollution, soil erosion, stream siltation and mutilated landscapes as major obstacles to both the quality of the environment and man's future condition on earth. Perhaps man has been greedy, thoughtless, careless or just plain ignorant, and he is just now learning that he must keep nature in business because it is essential for his own continued happy existence. He is learning, and learning fast, that to stay in business, he must help to keep nature in business.

5) Man is supposed to manage his activities in relation to nature so that his needs may be met with least harm to nature. Because there are many people and they all want different things at different times, but often in the same place, it is important to have good criteria and guidelines. If we know what we want, we should be able to know how we are to get it, making sure that we don't upset nature or our communities. How we do this should be discussed with all concerned before starting a project and, after agreement, should be written down. These are the 'rules of the game,' as it should be played.

6) I believe that industry has an increasingly real concern with discharging its environmental responsibilities. It should be prepared to do the things that it can believe in as fair, clear, practical, reasonable and necessary. It should be prepared to work with governments in deciding what these things should be. Agreeing on some rules, recommending what should be done by whom, how, when, and where, and seeing that it gets done fairly and properly; this is what we must do both to meet our needs and to keep nature in business.

7) We know that we do not have all the answers. We know that in mining for example, there is no one standard recipe to resolve all problems because of greatly differing soils, topographies, climates, desired uses, etc. We know the serious dangers of making superficial comparisons between problems in one area or country and another. And we know that a sufficient range of technology exists to carry out successful resolution of almost any specific environmental problem. That technology is continually being improved in every annual cycle.

8) Finally, it is my environment too. I am personally as dedicated to its conservation as any of those in the audience, perhaps more so. I cannot tolerate casual, careless or arrogant behaviour towards the environment.

THE GOVERNMENT - INDUSTRY PARTNERSHIP

Governments and industry are both concerned with economic growth, often involving large quantities of material resources and energy. Such activities carry with them the necessity of dealing with an enlarging potential environmental disruption accompanying such growth. The increasing complexity and manipulation of global resources requires sophisticiated management to ensure that the natural resilience of global systems is not exceeded, and that potentially irreversible disruptions and unexpected 'surprises' are avoided. It is impossible to say that this cannot be done and equally impossible to say that it will be.

One of the major problems facing governments and industry is that uncertainties about the future impacts of their current choices suggest that what are believed to be acceptable or even good choices for the near future may prove less satisfactory for the more distant future. This is particularly important because the scale of efforts is often large, and the degree of reversibility and time required to reverse some environmental impacts may be quite long.

Uncertainties often make it difficult for governments and industry to make universally accepted statements or choices on environmental issues. National and regional perceptions of value differ on many matters. Moreover, environmental impacts differ because of regional characteristics such as meteorology, topography, population density, and resource distribution. For such reasons, those concerned may take differing positions on the nature and extent of the environmental control measures required.

ENVIRONMENTALLY ACCEPTABLE

Governments and industry together lean increasingly on the two words, 'environmentally acceptable' as their joint objective in designing and qualifying industrial projects for implementation. For example, energy related projects require that economic, energy and environmental objectives must be balanced, and the costs of protecting the environment weighed against the benefits to be gained. Assessing where this balance lies is far from simple, but at some stage a judgement has to be made as to the degree of environmental protection for which the costs can be accepted by society, so that regulations and standards may be formulated.

The words 'environmentally acceptable' contain a strong element of judgement and are impossible to define in absolute terms. They may be understood to mean 'with effects on the environment which are acceptable to governments and to the public'. But what is 'environmentally acceptable' in terms of effects will change over time, and in particular with advances in pollution control technology and in knowledge of the nature and extent of environmental effects.

This means that, for the best judgements to be made about environmental acceptability, continuing attention msut be paid to environmental education, environmental awareness and perception, and to the many relevant areas of research and development. Governments, the private sector and the public are all concerned and each has heavy responsibilities. They should also develop awareness that new technologies arising from research and development in many countries now enable industry to resolve many of the environmental problems that it creates. This vital work must continue, supported by governments on behalf of the public, and by the industry, so that some damages we may now consider inevitable may be minimized or eliminated.

ENVIRONMENTAL EDUCATION AND INDUSTRY

The U.N. Belgrade Charter of 1975 defines environmental education as that branch of education which seeks to develop a population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivation and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.

The responsibility for providing environmental education lies largely at the door of those agencies entrusted by the public with the common good; schools, universities and government departments. It is a large public responsibility, and can only be managed this way. Others with considerable responsibility are special interest groups, industry and the media.

As an example of industry's growing sensitivity to the environment, and of its responsibilities for public environmental education, the private sector in Western Canada and Northwestern U.S.A. initiated and continue to support a program of assistance to the formal education systems called SEEDS (Society, Environment and Energy Development Studies). This highly successful programme develops energy and environment related materials for grades 1 to 12, assists teachers in their effective use, and conducts field trips with qualified guides, and is spreading widely in our two countries.

A special need that has been identified by both UNESCO and UNEP is that of improving the training of engineers in both the private sector and in government in conservation of the environment and the promotion of their awareness of environmental issues. A positive program to help fill this need is being developed, recognizing that environmental education has an important part to play both in general university education and in the training of specialists whose later professional activities, often as decision-makers in industry, are likely to have an impact on the environment and its associated problems, their prevention and solution.

CONCLUSION

Not too many years ago there was some fear and speculation that environmental concerns would fall by the wayside as Canada developed its economy to meet increasing demands for material things and energy. But this did not happen. In recent years the nation's awareness of its many-sided dependence on material goods and energy has sharpened. Over the same period, Canadians, including leaders of industry, have grown increasingly aware of their unparalleled environment and of those things that threaten it in the course of producing goods and energy.

I am prepared to continue to work with industry to encourage it to do those things that it sees as fair, clear, practical, reasonable and necessary; and to work with governments and the concerned public in deciding what these things should be. Much progress has been made, based on environmental education to a large extent. We are going to have to work harder, and work together to keep nature in business. But the results are worthy of nothing less that our best efforts.

VI.I. Schultz, Judith M. "World Population Imperatives Precipitate New Trends in Population Policy". Professor of Biology and Environmental Science, University of Cincinnati, Raymond Walters College, 9555 Plainfield Road, Cincinnati, Ohio 45236, USA.

The current world population size of 4,700 million is projected to rise to 6,100 million by the year 2000 and 8,200 million by the year 2025. Of particular interest are the demographic futures and population policies emerging from the world's most populous nations--the one-child family policy of China and the compulsory sterilization proposal of India in response to population growth the past decade. In addition, there have been intriguing demographic phenomena emerging within the Caribbean nation of Cuba.

India, maintaining the world's second largest population of 746 million persons as of 1984, is projected to grow faster between 1980 and 2000 than had been formerly indicated. The largest country in south Asia, India, maintains 15% of the world's population with only 2.4% of total world land area. India's population doubled between 1947 at the time of independence from British rule and again in 1981. India's recent accelerated population growth is due chiefly to a drop in mortality which has greatly outdistanced the decline in fertility. Knowledge of this phenomenon has resulted in calls for revitalization of the family planning program which suffered backlash during the 1976-77 coercive sterilization drive, a major cause of Prime Minister Indira Gandhi's political defeat in March, 1977. (In 1976-77, sterilizations rose to over 8 million, dropping to one million the following year. Acceptance of other means of contraception also dropped.)

Following Mrs. Gandhi's defeat in 1977, due in part to coerceive population policy, the new Janota Government avoided family planning issues. The shocking results of the 1981 census prompted Indira Gandhi to call for a "reinvigorated family planning program." However, implementation of such measures is extremely difficult, since 75% of Indians live in rural areas dispersed in close to 600,000 villages. Thirty-eight percent of urban Indians and fifty-one percent of rural Indians live below the poverty level. For the desperately poor rural Indians, children are an economic asset. Tremendous effort will also be needed to dispel the historical cloud of suspicion surrounding vasectomy.

Rapid population growth has defeated India's original plan to provide free education for all children up to age 14. Water supplies are dwindling with only 33% having access to safe drinking water in 1973. Reliance by 75% of Indians upon wood for 70% of energy needs has caused rapid depletion.

[A simulation exercise and fact sheet will be utilized at this point in the discussion to assist secondary/college students and teachers in dealing with population policy questions and compulsory vs. voluntary methods of birth control. The exercise will examine the compulsory sterilization law of the Maharashtra Assembly, the first of its kind in the world, passed (but not implemented) during the Emergency[1].]

The People's Republic of China, currently maintaining the world's largest population of 1,023 million in 1983, has undergone a recent, if not temporary, fertility decline in the past decade. The 1983 figure represents an increase of 329 million since 1964. This size and growth are the basis for both interest and concern. Of greatest concern is the scarcity of arable land. China possesses 7% of the world's arable land while maintaining 22% of the world's population. Only one-tenth of the land is arable. Population growth has caused a drop in arable land per capita. Importantly, expansion of cultivated land has apparently reached a limit.

In three decades, the reduction in Chinese crude death rate amounted to as much as the decline in U.S. death rate over a century. However, birth rates did not drop as fast. This decline in death rate was caused by winning major battles over disease, natural disaster and wars. The early years of the People's Republic resulted in unbridled optimism about population growth. By 1979, however, it was realized even that with the current number of persons in reproductive years, even a two-child family would imply continued population growth for another fifty years. As a result, the world's first "one-child family" national population policy and campaign was established. By 1982, 15 million couples had pledged to have only one child. Incentives for such families now include free health care for the child, bonuses, larger pensions, priorities in housing, school and employment. The 1982 census prompted even more intensified effort to limit the population size to 1,200 million by the year 2000, when it was realized that fifty percent of the population was under age 21, and that 13 million couples would reach child-bearing age in the next 18 years. This was in great contrast to the call for an increase in population to preserve the Chinese race by Sun Yat-sen, founder of the Chinese Republic in 1911. Communist party Chairman Mao had suggested that revolution plus production would solve the problem of food production and employment for the Chinese population, believing that an immense population size, vast territory, all abundant resources were a distinct advantage. Population size, however, soon came to be viewed as a liability to socioeconomic development. Debate ensued as to whether people should be considered producers (supply-side economies) or consumers (demand theory). In promotion of socialist development, in 1971 a national population plan for family planning was intentionally brought into the realm of state planning in contrast to individual choice in the capitalist nations. With the death of Mao and demise of the "Gang of Four" in 1976, emerging leaders were committed to birth control. Population regulation is now defined as a major political thrust to modernize the nation. Emancipation of women has made great strides, but China along with India is still one of the few countries of the world where males outnumber females. Male preference has resurfaced strongly with the one-child family campaign. Female infanticide is increasing, as is maltreatment of women rearing firstborn girls; underreporting of female firstborns in order to have a chance at a second male child is also common. The government is attempting to counteract this problem by coercive education. China's attempt to deal with demographic trends from a coercive basis continues to generate mixed opinions of admiration and admonition within its conflict of state authority vs. reproductive right of the individual.

Cuba, the largest and most populous of the Caribbean island nations, has an estimated 1983 population of 9.8 million. Among developing nations, Cuba has the highest life expectancy, lowest infant mortality, and lowest fertility rates. Historically, immigration caused a tripling of the population in the 19th century when 1/2 million African slaves and 120,000 Chinese indentured servants were brought into the country to support the booming sugar industry, and when hundreds of thousands of Spaniards and Europeans immigrated to the island. During the world economic depression, many former migrants returned to their country of origin. In the early 1960s mass immigration commenced, with an excess of 800,000 persons deported to the U.S. between 1959 and 1980 from the beginning of the revolution until the recent Mariel sealift of April-September 1980. However, also during the early 1960s, Cuba experienced an increase in fertility or a baby boom. The Cuban revolution has brought about dramatic changes in education and health, as well as improved status for women and has eliminated class differentials. An attempt to provide basic needs for all has resulted in a more austere society. Thus, the Cuban housing situation is currently reaching crisis proportions and difficult economic times are forecast.

Marriage rates rose as urban poor viewed redistribution of wealth of the socialist regime optimistically, and the government legalized consensual unions. When abortion was suddenly restricted and the economic blockade by the U.S. also dramatically cut off contraceptive supplies which had been mostly imported, birth rates dramatically increased. Fertility subsequently declined due to ease on abortion restrictions, such that in 1978 Cuba had the world's highest rates of legal abortion. Contraceptive practice is now relatively high and rising due to supplies made available by the government, the UN and International Planned Parenthood. A reduction in marriage rate and high divorce rate in the 1970s have also affected fertility decline. Government sponsored family planning services have now been incorporated into the health ministry. The government opposes the argument that overpopulation is one cause of poverty afflicting developing nations. Post-revolutionary modernization processes have involved compulsory education for children and adult education, raising of the status of women, and urbanization of rural areas. These attempts have decreased the value of children as contributors to old age security which played some part in reducing fertility. The recent deteriorating economy would certainly be expected to thwart aspirations of the population as did the depression. By 1980, the effects of the 1960's baby boom became evident with a surge in 15-19 year olds working age individuals. Coupling economic slowdown in a society which prefers early and universal marriage, it is not unexpected that Cuba's crime rate is dramatically rising. The housing shortage has become dramatically acute. The government, undoubtedly acutely aware of this demographic phenomenon has sent large contingents of Cuban civilians and military personnel to Africa, Central America, and Caribbean countries to relieve unemployment and housing shortages. This newest plan of the Castro government would indicate that enormous growth has not kept pace with education. The second phase of coping with this baby boom age cohort was the 1980 Mariel sealift. It seems clear that the Castro government planned the April 4, 1980 congregation of 11,000 potential emigrants into the Peruvian Embassy compound with official permission for all who wanted to leave. In the next five months, one half of the natural increase in population occurring during the peak baby boom year of 1963 left the nation of Cuba. The immediate results were the opening of thousands of housing units, reduction of crime rates, and reduction of unemployment pressures. The Mariel sealift added 122,061 Cuban immigrants over the U.S. legal total immigration quota of 400,000 in 1980, impacting population growth in that nation. Immigrants to the U.S. at the beginning of the Cuban revolution in 1959 had included wealthy, powerful, business persons, professionals, and many college-degreed, while the Mariel exodus included lower socioeconomic, primarily urban bluecollar proletariat, which required greater efforts at assimilation by the Carter administration of the U.S. Government. As more cohorts mature, a future exodus is undoubtedly within the planning of Fidel Castro. An echo boom can also be expected from those who remain behind to establish their own families. When this echo baby boom reaches retirement age, medical and pension benefits can be expected to consume an inordinate amount of Cuba's resources as a socialist state.

[1] Schultz, J.M. and Coon, H.L. Population Education Activities for the Classroom., 1977 ERIC/SMEAC. The OHIO State University. Contact author for revised version.

VI.J. Swibold, Susanne M. "Environmental Censorship and the Media - A Test Case: The Fur Seal Harvest of the Pribilof Islands". Flying Tomato Productions, Box 910, Canmore, Alberta TOL OMO, Canada.

Over the last four years I have been producing and directing films on the Pribilof Islands, Alaska. The four films in the series will comprise the most comprehensive block of work ever done on these island habitates and their inhabitants, the Aleut people. The first film of the series, "Peter Picked a Seal Stick", is completed and will be featured in this session. The film is a straight-forward documentary of the fur seal havest of the Pribilof Islands, from the killing field to final boxing of blubbered pelts. We provide the edited film and the Aleut people scripted and narrated to the picture. Aleut history is highlighted by a series of archival photographs and a song written and sung by an Aleut couple. The film is not an issue film; nor was it created to encourage or discourage the event. It was produced as a faithful record of sealing in collaboration with the Aleut people. It is the first film of its kind to adopt a native point of view in relation to the harvest of a wild animal.

The growing awareness of environmental and animal protection groups about Canada's harp seal harvest and now the Pribilof fur seal harvest have made sealing very controversial. However, both the media and animal rights groups have failed to present a comprehensive visual portrait of the harvest, including the human element involved, their point of view and their history. Without this basic understanding of the entire process, involving the Aleuts for over 200 years, the Pribilof seal harvest becomes a propaganda vehicle obscuring the whole truth of a very complex issue.

In showing our film to television networks, producers have been reluctant to broadcast the film, preferring instead to show short clips of clubbing on the harvest field coupled with "talking heads" offering opinions on the issue. We have further discovered the television networks want artistic control to edit the film to their format, destroying the integrity of the content. There is an apparent reluctance in the media - newspapers, magazines and television - to address the complexity of seal harvesting. The treaty nations involved in the Pribilof harvest are very aware of the seals' health, population and welfare *as well as* the Aleuts' livelihood and culture. Television has not addressed this environmental issue in its complexity and promotes hate and violence towards the Aleut people by portraying them as "senseless killers of an innocent wild animal" through clips of the clubbing scenes on the harvest field.

How do we begin to face the complexity of man and the environment in a responsible way? How can we begin to understand that *whole habitats* are destroyed by agriculture and offshore oil drilling? How can we begin to understand that man will always have an interaction with wild animals, plants, trees, as well as domestic animals and agriculture, but in a balanced equilibrium, not an either/or situation. If we force an all-agriculture (including aquaculture) food environment and an oil-based clothing economy, we will destroy the balance of the planet in the food chain and in global weather. We are not teaching our children or ourselves about the reality of killing wild animals for subsistence and for some necessary clothing. The people of the circumpolar regions have different needs and ways of life than those of us in warmer climates. The people of the equator and south sea communities have different needs in food and clothing than those of temperate zones. How can we realize that the survival of the wisest will mean a sharing and conserving of *all* the natural resources?

How can we realize we are an integral part of living systems and recognize the necessity of balancing our values to fit nature's laws and economy? Self-awareness and self-discipline in choices of our ends as well as our means will become paramount to our survival as human beings. We must want to know the complexity and full picture of our environmental problems so we may wisely perceive what can be given and received in balancing the situation. Self-restraint and self-discipline have been lacking in our society as we have removed more and more external restraints. This has created an imbalance psychologically and sociologically in internal and external conflicts and aggressive-defensive responses requiring prevention or cure. We must join feeling and reason, non-verbal and verbal as well as our subjective and objective sources of information for problem-solving. The scientist and the artist will be required of all of us if we are to act with wisdom in our environment.

VI.K. von Hofsten, Anne. "Acid Rain in a World Conservation Strategy Perspective". The National Swedish Environment Protection Board, Information Section, Box 1302, S-171 25 Solna, Sweden.

The aim of the World Conservation Strategy is to achieve the three main objectives of living resource conservation:

a. to maintain essential ecological processes and life-support systems on which human survival and development depend.

b. to preserve genetic diversity on which depend the functioning of many of the above processes and life-support systems.

c. to ensure the sustainable utilization of species and ecosystems (notably fish and other wildlife, forests and grazing lands), which support millions of rural communities as well as major industries.

The objectives thus formulated are important, but must be explained to the public and school children in a concrete way. This can of course be done in many ways, but I would like to do this with acidification as an example. The UCS draws the world's attention to the increasingly dangerous stresses being put on earth's biological systems and recommends measures for relieving them. The Strategy calls on all nations to adopt conservation policies and practices at home, to join international efforts, to improve the human environment worldwide and to protect the biosphere that sustains all life on earth. Acidification is a problem that occurs almost all over the world and whole ecosystems will be exterminated if nothing is done to stop it. It is an international problem that is not recognizing any borders. It is also a problem that goes deep into many ecological systems with an influence both on higher and more primitive organisms and with both primary and secondary effects. All this means also, that it is a good example of how ecological systems function and how man's activities influence those systems.

One main purpose of the Strategy is to persuade the nations of the world to adopt ecologically sound development practices. The air pollution of today in western countries is not a sound development. Nature (lakes, forests, the soil) has reacted strongly. It is time not only to explain to decision-makers, but also to our children and youth--the decision-makers of tomorrow. Acidification is a dramatic and serious problem that concerns all of us.

"Perhaps the worst environmental threat ever to hit us, an ongoing environmental catastrophe" are drastic terms in which acidification of land and water in Scandinavia and North America have been described.

The effect of acidification depends on the scale of the total deposit and the inherent resistive power of land and water. Winds and airmasses around us transport the emissions from one place to another regardless of frontiers. This is why it is an international problem, it is why we in Sweden and Norway talk about it as one of our biggest environmental problems in the 1980's.

The history of acidification goes back several hundred years when the fossil fuels, mainly oil and coal, were formed. Over the last 200 years we have released that long confined sulphur and let it go out in the atmosphere. Another serious emission is from the car exhausts, the nitrogens.

The SO_2 from the chimneys occurs either on small particles or in cloud and raindrops. This is how it literally rains acid.

WATER

The primary effect of acid rain was first recorded in the 1960s in Sweden when more than 18,000 lakes of Swedens' 98,000 lakes were acidified and 4,000 of them were seriously acidified with severely damaged animal and plant life. The number of species decline with low pH. All "normal" life is gone at pH less than 5. The white mosses (Sphagnum sp.) are left to cover the bottom and water is very clear due to a declined decomposition of nutrients.

Besides these effects of low pH, it also means an increasing content of aluminum and other metals, like cadmium, zinc and lead becoming more soluble and thus more easily accessible to animals and plants. The gills of fish, for example, are covered by a kind of jelly - caused by a chemical process with the increased content of aluminum. The fish can not breath normally and die.

SOIL

By expansion with water, soil has great resistance to acidification, but this varies, of course, depending on the bedrock and soil types. That Sweden (and Norway) are so hardly hit by acidification is mainly because of our bedrock of granite with very little limestone. Modern silviculture and agriculture help to create imbalances between the production and consumption of hydrogen ions in the ground. We fertilize, we till the soil and we harvest the plant mass. When plants absorb nutrients they rid themselves of hydrogen ions at the same time, thus acidifying the soil. When, on the other hand, parts of plants are left to rot, the process goes in the other direction and the soil becomes less acid.

When the soil has become acidified plants can more easily absorb heavy metals like cadmium. Our crops have ever higher contents of cadmium and it is not advisable to eat kidneys and liver of moose and row-deer because of the cadmium content!

FORESTS

The most evident effects of air pollution are seen in the forests. It began with occasional reports but in 1984 forest damage is common in southwest Sweden where the dominant winds come from southwest which means from Central Europe and the UF. About 75% of acid precipitation comes from abroad while the rest comes from our own sources. Also, beeches and other decidious forests are affected with changes of colour of the leaves and stunted growth!

Other effects of acid rain

Groundwater is affected and many water supplies are based on ground water. Heavy metals are dissolved in the water. Children come down with diarrhea and their hair becomes green because of the copper in the water, etc.

The sulphur (and nitrogen) deposition causes corrosion of metals with high costs every year. Still worse is the irreplaceable damage to historical monuments. In the last 100 years many monuments have suffered more than in many hundreds or thousand years past.

We face a world wide problem where not even the Arctic is healthy. The Ymer expedition in 1980 found that the Arctic becomes the final deposit of long-ranged transport air pollution from Europe and North America. What does this mean for the climate?

With all this in mind we have started many projects on how to give information about acid rain and its effects to school children and to show what can be done about it. A positive approach is very important. A few schools have adopted a lake and made chemical and biological investigations and compared an acid lake with a healthy lake. They have noted the differences, they have made studies in the laboratory, interviewed old people and fishermen on how it looked years ago. Everything is noted and followed up at different seasons. Parents are invited to learn about the problem as are local authorities. Villagers are invited to bring water from their wells and have it analyzed. Last but not least, the children do something about it. They lime the lake in winter. (The lime is paid for by the authorities. Twelve million dollars yearly is used for liming lakes in Sweden!) The whole village is engaged in this project.

Also, primary school children take active part and all teachers and most subjects at school are involved. Could you think of a better integration of school subjects, of better balance between theoretical knowledge and practical work, with an international outlook? "What I hear I forget, what I see I remember, what I do I understand" is an old Chinese proverb. The teachers involved know it is true. Similar projects are now started to follow the changes in forests and in the fields.

Much more could be said, but let me also mention than IUCN, Commission on Education through its North West European Committee has started a joint acid rain project where Swedish and Norwegian experiences are used from all the member countries and a teachers training course is being planned.

To ensure the sustainable utilization of species and ecosystems as stated in the World Conservation Strategy, we must fight air pollution with every means there is no time to wait. The degradation of ecosystems is accelerating and we all depend on them. There is only one earth!

VII.A Allen, Barry. "People, Parks and Preservation". Director of Environmental Studies, Rollins College, Campus Box 2753, Winter Park, Florida 32789, USA.

Perhaps the most underestimated (and under-researched) problem facing preservation efforts today is that of excessive and improper land acquisition. Government acquisition of private lands for incorporation into National Parks, National Recreation Areas and other components of the National Park System has always been, and continues to be, the protection strategy that has all but monopolized protection efforts.

Increasingly this strategy is being called into question by property owners in and around components of the National Park System, by federal officials with budgetary responsibilities, by those interested in historic preservation, and belatedly, but finally by conservationists as well. The long neglect of the problems associated with land acquisition as a management tool (or the denial that problems indeed exist) threatens preservation efforts. By closing our eyes to the increasing problems of this approach, the "preservation movement" has left fertile ground for the exploitation of this issue by those in the far right who are opposed, for ideological or material reasons, to any federal efforts to protect important or threatened lands and landscapes.

At Big Sur, along the scenic rivers of the Olympic Peninsula, on the Upper Delaware, and elsewhere, preservation efforts have been hampered and even defeated by a fear of federal intrusion into the lives, lifestyles, and livelihoods of local communities. These fears are well-grounded; the usual NPS policy of acquiring all lands within park boundaries regardless of the need for a given parcel, the status of a given parcel, or the threats to a given parcel has resulted in many well publicized problems for individuals, families and communities.

It is often argued by National Park Service officials that this is a necessary evil, an unfortunate side effect of preservation efforts. When questioned about the eviction of 142 families from along the recently designated Middle Delaware Scenic River, an NPS official remarked somewhat flippantly that "you gotta break some eggs to make an omelette." This analogy is not only insensitive, it is also untrue.

European nations have for many years employed strategies for land protection that are much less disruptive than those used by the National Park Service. Recently, some parks in the United States have begun to experiment with many of these same approaches that minimize outright acquisition.

In fact, it could be argued that fee simple acquisition and its subsequent removal of local residents is a less than satisfactory preservation policy in many areas -- especially those settled areas with important cultural, agricultural, and historic resources. Its impacts on property owners and local communities are severe. It is often not a cost effective way of preserving complex landscapes. And, it is often inconsistent with the intent of Congress and the expectations of both local preservationists and area residents.

For example, at Delaware Water Gap National Recreation Area (DWGNRA) the National Park Service has followed a policy of total acquisition. It now owns over 80 structures on the National Register of Historic Places including several farms. All of these structures were functioning and in fine repair when in private hands. Now, lacking funds to maintain these properties, the NPS has allowed them to fall into disrepair and become the target of vandals and arsonists.

At DWGNRA, Cuyahoga NRA, and Lake Charles NRA excessive acquisition has decimated the tax base and disrupted essential services, including police and fire protection. In addition to the hardships suffered at the community level, the impact on families and individuals create hardships from which many never recover.

Recent GAO reports have charged that NPS land acquisition policies often violate the intent of Congress. At Big Cypress National Reserve, Lower St. Croix National Scenic River, Golden Gate National Recreation Area, Voyageurs National Park and other components of the National Park System, officials failed to consider alternative strategies for land protection. This has resulted in large cost overruns, delays in implementing management plans, and considerable ill will toward the Park Service and often preservation efforts as well.

Despite the reluctance of federal officials to use them, there are many effective strategies to protect valuable lands and landscapes that involve minimal acquisition of private lands. Local and state zoning regulations, preservation easements, federal dredge and fill regulations, tax incentives and many other tools have been used successfully all around the country and at all levels of government.

Adirondack State Park in New York and the Pinelands National Reserve both show how regional planning can protect complex landscapes without unnecessarily disrupting community life, lifestyles, and livelihood. State scenic rivers programs in Wisconsin, Minnesota and Oregon indicate that local zoning and state taxing authority can be used to preserve river corridors. The Upper Delaware Scenic River is a more recent attempt to integrate all levels of government and the general public in the preservation effort.

European countries, faced with considerable human activity within proposed park areas have come up with interesting and effective strategies for land protection. In England and Wales, the Greenbelt Parks, the Areas of Outstanding Natural Beauty, and the National Parks all use zoning controls developed by local planning authorities to limit and control land use and developement. In West Germany the Natureparkes are managed to provide environmental preservation, agricultural development and recreation. The French National Regional Parks integrate nature and community. Local crafts, small family-run lodgings and historic preservation are all important components of park planning. The goals for all these European park systems are minimal land acquisition, minimal disruption of local ways of life and preservation of the cultural landscape.

The U.S. National Park System is growing and expanding into areas that have long since lost their "pristine" character. Many of the newer units of the National Park System have been settled for generations. They possess not only natural resources, but cultural, historic, and human resources as well.

The inability or unwillingness to cope with existing and traditional communities in park areas is a threat to existing parks and their resources as well as to potential additions to the National Park System.

None of this is to argue that land acquisition is not an important and often necessary tool for land protection. It should, however, indicate that other protection strategies are often necessary. These alternatives to land acquisition need to be explored and implemented when appropriate. It is the almost total reliance on fee simple acquisition which I am objecting to here. Other strategies have been proven successful both here and abroad. These alternative strategies deserve greater attention by both government and the environment community.

VII.B. Anderson, Eddie. "Creating Environmental Awareness Through Natural Resource Education". Coordinator, Natural Resource and Environmental Education Program, Forest Service, United States Department of Agriculture, 12th and Independence SW, P.O. Box 2417, Washington, D.C. 20013, USA.

Introduction

Throughout its history the Forest Service has undertaken a number of education programs to promote understanding and knowledge in many areas. These programs have been used, for example, to emphasize research results and activities, cooperative forest fire prevention, visitor information and interpretive services, environmental pollution and litter, youth conservation work and environmental awareness, and environmental education. Except for the environmental education program, which is broad in scope and focuses on resources in general, most of the efforts have been used to achieve an unusually high level of success compared to campaigns and programs of other federal agencies and national organizations.

Program

The Natural Resource and Environmental Education (NREE) Program is the newest Forest Service education program on line and competing for acceptability and support. Begun in 1981, this program builds on the Environmental Education program introduced in 1970. As with the older program, the basic focus is on developing public skills for understanding and implementing environmental actions and programs.

The NREE program, however, goes farther in developing these skills by providing information relative to various elements involved in local, regional, and national resource issues. It also strengthens support for land and resource management through organizational relationships and external cooperation. Materials are developed for a wide variety of audiences from youths in school and in conservation and environmental education organizations to in-service and other adult audiences.

Purpose and Objectives

The NREE program proposes to establish itself as a vehicle for accomplishing two basic purposes. These are (1) providing assistance to resource managers in meeting their program goals and objectives, and (2) providing a balance between the technical and social processes of the Agency by offering multi-audience education material and processes for developing and conveying education, research and technology transfer topics, results, and effects.

Environmental education in its simplest form deals with communicating the effects of human activity on the environment. Therefore, relating the work of resource professionals under legal, technical, social, and economic constraints contributes greatly to the education process. In this perspective the program also proposes to expand knowledge of resource management by focusing on the relationship of the professional resource manager and his/her responsibility for stewardship through conservation, management, planning, and design.

Major Characteristics

The NREE program has the following major characteristics:

1. It is national in scope; that is, it attempts to achieve its purposes and objectives on a nation-wide scale while maintaining the flexibility to deal with local, regional, and national matters and topics. All units of the agency are affected by the program.
2. It promotes internal support for the program through internal review of materials and planned communications of information relative to issues and problems common to the various resource management activities and groups.

3. It competes for resources as do other programs and therefore operates as efficiently in its input/output relationships.
4. It provides outputs of information and educational materials for use by the agency and the public.
5. It is resource issue driven. As issues change so does the subject matter of the program. This process allows for flexibility and ease in focusing on issues determined to be of importance at a particular time.

Program Design

The design of the NREE program is in response to many activities, efforts, and trends that have taken place over the preceding years since the passage of the National Environmental Policy Act. This includes the enactment of federal and state enabling legislation for enhancement and support of environmental quality, management, and protection; population migration to and from rural areas and the effects of this phenomenon on the resource management and production; changes in societal, organizational, institutional, and individual values and decisionmaking strategies; and changes in outlook for resource demand and supply.

Material Development

Materials are developed by interdisciplinary groups with agency education specialists taking the lead in the work. The material is developed by use of a modular approach.

Modular Approach: The modular concept and approach for developing resource education material involves the use of a central building block or unit around which other materials may be developed or adapted for use with different audiences to achieve objectives. At least four basic categories of material are included in each module. These are:

1. Background material to cover areas such as the social history, economics, social or psychological relationships, national and state laws and/or local ordinances, national, state, and local management plans, and emphasis areas, etc.
2. Learning activities and education exercises to include features such as important definitions, field trips, problems, case studies, mock plans, simulations, games, etc.
3. Briefing materials that include supporting research results, decisions, actions, or approaches that clarify, summarize, or highlight the problem or issue. These materials are presented by means of video or slide tape, fact sheets, newspaper, clippings, report summaries, or other suitable media. Information is also available on contact.
4. Reference and source material for review and/or additional study of issue components, relationships, effects, etc.

This approach is supported by:

1. Involvement of resource staffs most affected by the issue.
2. Internal reviews by other resource staff members, individuals, and groups. This process in and of itself is viewed as an important communciations process with predictable positive benefits.
3. Cooperation of all segments of the Forest Service -- National Forest System (NFS), research, state and local agencies, education, public and private organizations, industry, and other cooperators depending on the issue. This is highly important in that resource issues almost always transcend National Forest administration boundaries and affect other people and resources. Materials developed cooperatively with others tend to broaden the base of understanding and extend the range and opportuntiy for use.

Delivery System

The NREE program makes use of three methods of delivery:

1. Briefing sessions for selected audiences.
2. Workshops
   a. To teach others to use existing material.
   b. To develop material on an issue of mutual importance.
3. Exhibits and expositions.

Summary

The NREE program is not a solution to all the problems of the Forest Service but it does have exciting possibilities for some areas. It can be very helpful in promoting environmental awareness, rural-oriented skills, and a better understanding of resource management processes, problems, and issues. The future of the program is dependent upon the support it receives from the Forest Service for resources -- people and funds to make it go -- and upon support from the public. We hope these are forthcoming.

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VII.C. Barwise, Joanne. "Development of an Environmental Education Centre: The History of Shannon Terrace Environmental Education Centre". Environmental Education Coordinator, Fish Creek Provincial Park, Box 2780, Calgary, Alberta T2P 0Y8, Canada.

Park Development History

Local communities and conservation groups were largely responsible for the creation of Fish Creek Provincial Park. City of Calgary park planners proposed the park in 1966. In 1972, the Provincial Government purchased some park land and in 1973, 15 million dollars was allocated for its development.

In 1973 a Fish Creek Advisory Committee was set up to determine what kind of park the people of Calgary wanted Fish Creek to be. Based on the results of a questionnaire published in Calgary's two newspapers, a concept plan was developed. Public hearings were held to obtain comments on the concept plan and a committee was struck to coordinate the planning and implementation. One of the committee's recommendations was that facilities should be provided for environmental education.

Shannon Terrace Environmental Education Centre

In 1979, the Minister of Recreation and Parks responded to requests from the Calgary Board of Education and the recommendations of the planning committee by announcing the development of the Shannon Terrace Environmental Education Centre in Fish Creek Provincial Park.

Rather than build a new centre, one of the homes expropriated by the government in purchasing the park's west end was deemed suitable for renovation.

Alberta Provincial Parks' environmental education and planning staff and consultation with the Calgary Board of Education determined how an existing building could be renovated to serve as a year-round environmental education centre. The 5,000 square foot building now contains functional areas for public use, group use, and administration. Because the centre is designed primarily for school use, public access is limited to the main entry, reception/information area. Areas available for group use include the orientation area, three classrooms, an exhibit called the Discovery Room, resource centre, and a small meeting room. The administration area contains staff offices, workshops, storage and maintenance areas.

The centre has a landscaped setting adjacent to natural areas of white spruce, aspen, and balsam poplar forest. The programs utilize the regular park trail system through a diversity of flora and fauna and aquatic environments.

Three methods of operating the facility were considered: They were as follows: (1) Provincial Parks operates the centre completely, providing all staffing and programming; (2) Provincial Parks coordinates use of the centre. Group leaders are responsible for devising and conducting their own program; however, Provincial Parks will support materials and training for them; and (3) The centre operates on a concession basis by a private group, following minimal guidelines established by Alberta Provincial Parks.

After the consideration of all alternatives, advantages and disadvantages, Option 2 was adopted.

By 1981, building renovations were completed and an Environmental Education Coordinator was hired to develop programs, control bookings, develop exhibits, and plan the general operation of the centre. A caretaker was hired to maintain the centre and grounds.

One year prior to the Centre's planned opening date, work began on developing programs and purchasing furniture and necessary supplies for the Resource Room. Initial priorities were in the development of the centre's resources.

I. Display Development

Three areas in the centre were identified as requiring displays of various complexity: (1) Public Entry/Information area; (2) Group Orientation area; and (3) Discovery Room.

A Terms of Reference was developed and sent to five firms to bid on.

Entry/Information Area

Entry exhibits were to establish a sense of arrival, capture visitor's attention, stimulate curiosity and introduce the centre. Adjoining the entry is the information desk area. This area is designed to provide park visitors with park information and schools with a check-in point.

The information desk was not designed to be operated as a full time information service with a special attendant. It was designed to handle casual information requests of drop-in visitors. When the Environmental Education Centre is closed, an Information Cube, a type found throughout the park, is located outside the centre.

Directions to the contractor were limited to general objectives that we hoped the completed exhibits would fulfill. The entry exhibits now consist of historical panels above and behind the information desk. Two panels, one on the Centre, the other on the park are part of a wall unit with doors that open to simple messages or photographs on the Centre and park themes. The doors work well in stimulating a degree of curiosity and visitor interest in what is behind them.

Group Orientation

Alberta Recreation and Parks Environmental Education Policy emphasized the "...development of support materials and the training of user group leaders and not actual field delivery...of programs." Because of this and the stress on non-consumptive public use and preservation of resources, it was felt that park-conducted orientation should be provided to all groups to set the proper tone for the groups' activities and to heighten the park's personal profile as the administrator and custodian of the park.

The objectives of this orientation area were to: (1) establish immediately the participatory/interactive aspect of the centre and its program; and (2) orient group visitors to the facilities, natural and cultural history of the park and define environmental education concepts that are appropriate.

The exhibit design that was accepted included a large stylized park map with doors that opened to photographs and exhibits supporting a complete park discussion, and special puzzle seats that teach two park/environmental themes. Both the map and the seats are used by the groups and seem to fulfill their intended purpose very well.

Discovery Room

The main objective of the project was to produce an innovative hands-on exhibit system, which would be child directed rather than teacher directed. It was hoped that positive experiences in self-discovery gained in the Discovery Room would reinforce the self-discovery program developed for the field.

The exhibit themes planned were diverse and meant to employ a wide variety of media, sensory experience and intellectual development. We hoped it would be like a giant environmental education toy box that could never be utilized in one session and would require repeat visits. The level of preparation required for this contract was very high. Contractors cannot be expected to research and produce such exhibits to meet the particular vision of park personnel. By providing all written material and reference materials for graphics and minutely detailed specifications, this project succeeded. Without the detailed specifications and close liaison with key park staff, it is doubtful that most companies would even bid on such a project.

Exhibits completed to date include elaborate animal and plant costumes, Discovery Boxes, Feely Bags, kaleidoscope, Children of Fish Creek, an Energy Game, and a Beaver Lodge.

All materials were thoroughly reviewed and edited a number of times by a team of visitor services personnel representing park, region and head office levels. This process contributed greatly to the overall quality of the exhibit.

II. Program Development

Concurrent with exhibit development was the development of school programs. During the previous planning phases, several things were decided prior to staff arrival: (1) that programs would be teacher-conducted; (2) that park staff would greet and orientate groups to the centre; and (3) that park staff would conduct workshops for teachers to familiarize them with the program and the facilities.

Given these, programs needed to be developed that keyed into the Alberta curriculum, were targeted to grade levels that conducted a lot of field trips, tied into park themes, and had an environmental education philosophy and process.

A basic program and activity sequence was established in the first program to serve as a model for all subsequent programs developed. It was decided that the first two programs would be ENERGY and CYCLES.

Both topics support the Environmental Education policy and school curriculum. Further, they are core curriculum topics for the most easily accessible markets--grades 4 to 6. To attract interest and curiosity, these programs were intended to be very active and participatory.

The activities were test run by the Environmental Education Coordinator on summer day camps, modified and then incorporated into the program package. The programs were reviewed by teachers, school board consultants and park staff. This process was followed for all the programs developed.

III. Operating Plan

A Centre Operating Plan was developed by park, regional, and head office staff, to provide operational guidelines based on Environmental Education policy within the constraints of staff, and resources available. The plan was the directing document during the initial year of facility operation which began in September 1982, and is subject to periodic review and modification. The operational methods in the plan were designed to make the best use of existing resources and staff, and to ensure that high standards are maintained, consistent with the overall standards and level of service provided at Fish Creek Provincial Park. The plan also served as a tool to familiarize Recreation and Parks staff and client groups with the role and functions of the facility.

An Operating Plan is important. The Centre plan identified specific issues that are not usually addressed in facility planning. For example, centre promotion, method of booking, hours of operation, visitor information, method of group orientations, outdoor group use impact assessment, program options for teachers, and so on. It provides guidelines that ensure continuity of operation. Staff may change but the plan does not. The plan helped to minimize the possibility of conflicts brought about by unrealistic expectations at other levels of the organization or potential confusion resulting from a lack of established procedures.

The Shannon Terrace Environmental Education Centre currently has 12 teacher-conducted programs. Teachers booking into the facility attend a workshop at the Centre prior to arriving with their group. Each teacher receives a program package which contains preparatory, on-site, and post visit activities.

During the school year 1982-83, the first year of operation, school visitation was 4,289. In 1983-84, 7,683 visited. The centre's optimal use is approximately 10 to 11,000 students.

Its success can be contributed to a large extent to the planning prior to opening the doors to schools. More reviews are expected of the Operating Plan to ensure the smooth operation of the centre; as well, more schools will be using the centre.

During the 2 years of operation, several teachers have made as many visits as 6 with classes. The programs have been designed to allow repeat visits and we are pleased to see teachers viewing and using the centre as a viable, reliable resource to teach in the outdoors.

The centre is a commitment by Alberta Recreation and Parks in the field of Environmental Education and will be part of our heritage and the education of our children.

VII.D. Coombs, Mary S. "The Students are the Explorers, Discoverers and Scientists." Coordinator of Children's Programs, Arnold Arboretum, Box 395, Franconia, New Hampshire 03580, USA.

At the Arnold Arboretum, Boston children are having the experience of being explorers, discoverers, and scientists. Boston area teachers are discovering the Arboretum's Children's Program as a way of covering parts of their curriculum without their having to become instant botanists.

The Arnold Arboretum is located in Jamaica Plain, a section of Boston, Massachusetts. This 265-acre collection of woody plants was designed by Frederick Law Olmstead, and contains trees, shrubs, and vines from temperate regions throughout the world.

The Arnold Arboretum was the first arboretum intended for both university and public use. It is a part of the Boston City Park system and of Harvard University. In addition to being a valuable scientific institution, the Arboretum offers many educational programs and events.

The newest addition to our public programs is the Children's Program. It consists of four FIELD STUDY EXPERIENCES. Each Experience teaches a hands-on lesson in botany, natural history, and ecology, while integrating other skills and disciplines.

For years science curriculum has been a low priority in many school systems throughout the country. In the Boston Public Schools (BPS), the quality of science education has been declining, particularly in the elementary grades. There are several factors which contributed to this problem. These include: low teacher morale and weak science training; funding limitations; and no updated, systemwide set of standards.

In the fall of 1983, a new citywide Science and Health curriculum was developed and distributed to the schools in Boston and to several science institutions. Development of these curriculum objectives was a great step towards clarifying what is expected in the classroom from educators. However, given the present state of training of teachers and the resources available to them, many are overwhelmed by the bulk of information for which they are now responsible.

The Arnold Arboretum was one of the institutions contacted as a resource to provide supplemental assistance to the schools. Museums and science centers offer new methods and creative approaches with the use of collections, reference materials, and specialized staff. These institutions are equipped to teach many areas of science with expertise and resources not available in the classroom.

This year, the BPS issued an "Implementation Plan." Cited are three ways in which outside institutions can help implement the curriculum. They are: conducting teacher training workshops, providing materials and outreach personnel, and curriculum-based classes at institution sites.

In response to this request and in recognition of the need for improved science education, we have begun a program of assistance to elementary schools, including: the Field Study Experiences, a resource to teachers, and a reference center.

The Field Study Experiences

The FSE's do many things. They are designed to give the students the experience of being explorers, discoverers, and scientists. They are hands-on and activities-based. They integrate the basic skills of reading and mathematics, and the arts and humanities. Each child creates a tangible product, leaving the experience with their own chart, drawing or poem. Lastly, the TSE's teach science as a living process, rather than a dead language. All programs stress development of the skills of observing, investigating and asking questions.

Because the birth of this program coincides with the release of the new BPS Science and Health curriculum, in many cases we were able to address the objectives directly.

The four Field Study Experiences are: HEMLOCK HILL, AROUND THE WORLD WITH TREES, PLANTS IN AUTUMN, SEEDS AND LEAVES, and FLOWERS.

HEMLOCK HILL is a study in forest ecology. The students are first given an introduction to these topics through a discussion and display of materials, after which we travel to the other side of the Arboretum to explore the native stand of hemlocks.

There, they observe and measure several environmental parameters such as wind, light, climate, and biotic surroundings, as well as their feelings about a space. It is a comparative study recorded on a simple chart, requiring the use of basic skills.

When the chart has been completed, the students have collected data from two distinct areas; the base, which is an open lawn environment, and the cool, forested top of Hemlock Hill.

The walk from the base to the top of the hill is loosely structured, and the children are free to collect, explore, inspect, and investigate whatever catches their eye. They are provided with bugboxes and magnifying glasses. The walk back to their bus is usually filled with questions, many of which are answered with a question for them: "What do you think?"

In AROUND THE WORLD WITH TREES, students explore the collection of deciduous trees, focusing on the Arnold Arboretum's special role in plant exploration and cultivation. This program stresses the positive impact that humans can have on a natural environment.

Once the children arrive, they view a specially designed slide show on the plant explorers. They learn about the travels of Ernest 'Chinese' Wilson, who introduced over 1500 new plants into cultivation from the far east.

The activities start outdoors with specimens located around the Visitor Center. The students first assume the role of a plant hunter--exploring uncharted land in search of new plant species, and observing individual trees with regard to size, shape, form, color, flower and fruit. Because the name and the country of origin must be filled in on the chart, the children learn to read and interpret the labels which are found on all specimens. Tape measures and magnifying glasses are used.

This program brings the students on a walk to the pond area where one is apt to hear "the amphibian overture to spring" or see a great blue heron at the water's edge.

In the fall children may participate in PLANTS IN AUTUMN: SEEDS AND LEAVES. In this FSE, they explore the arboretum's paths observing and collecting seeds and leaves from a wide variety of plants, noting their seasonal changes.

The students are able to bring back their seed and leaf collection to their classroom for later use. They learn about preparation for winter by plants and animals, structure of flowers and seeds, plant reproduction' seed dispersal and germination, and uses of seeds for animals and humans.

This program brings the students along the meadow area to the maple grove. Leaves are inspected and seasonal coloration is discussed. Here they can compare leaf shape and color of some of the 137 different kinds of maples at the arboretum.

FLOWERS is a strong botanical lesson. At the arboretum, children have the opportunity to see growing flowers, rather than learning flower structure from generic models. Through the study of flower structure the concept of family and identification is introduced. Pollination mechanisms are investigated and observed. Early spring and seasonal changes that plants undergo are witnessed. Children see that most trees indeed have flowers. They see a wide diversity of flower form: dandelions, magnolias, willows and more. Flowers in this setting can be appreciated for their "ingenious" design and "smart" adaptive features.

Resource to Teachers

The children are not the only students. The teacher as well gains a useful science lesson from the FSE's. In fact, when a trip is scheduled, a pre- and post-visit packet is sent to the teacher. The contents of this package includes materials to be used in preparation for the visit, handy activities and lesson plans, as well as follow-up materials to complete the experience for teacher and student. This information helps ease any anxiety which may be involved in field trip planning.

Much time is spent by the coordinator and teacher discussing the particular needs of the individual classes and the tailoring of the appropriate FSE to fit those needs.

Reference Collection

In addition to our FSE's and outreach services, the Arnold Arboretum maintains a collection of books, articles, films, journals, slides, posters, and field guides which may be borrowed free of charge by teachers. All materials relate to the natural sciences, with special emphasis on botany and science education.

The Guides

The volunteer guides are a very important part of the program which involves their recruitment, training and coordination. These guides are parents, retired persons, college students, professionals, and former teachers.

All guides participate in an Arnold Arboretum course entitled "Sharing Nature with Children: Training Guides For Children's Tours." In this 15 hour course, each participant receives an introduction to the Arboretum's history, purposes, resources, and collections, as well as needed botanical and ecological facts. Guides-in-training are led through the actual FSE's, which equip them to lead classes through those same programs. New guides are urged to participate first as observers and then to lead groups on their own.

Development of the Children's Program as a whole has involved liaison with teachers, science coordinators, administrators, and parent groups of the Boston area schools. This stage is extremely important, in fact, crucial. Without establishing this relationship, no program can hope to be adopted and used. How did we do this?

We visited local schools and presented the program to principals, teachers, and their classes. Several meetings were held with representatives of various BPS agencies. We started with the Institute for Professional Development to discuss teacher training and explore effective means of communicating with elementary school teachers.

After a major mailing and our "crusades" were underway, a meeting was held with the manager of Instructional Services, who designed the curriculum. He enthusiastically reviewed the Program and commended it as a model of an integrated approach to achieving the curriculum objectives.

The Arboretum education staff have been cooperating with other science institutions in the Boston area as a member of the Cultural Education Collaborative, an institution responsible for helping the city's schools to better utilize the area's resources.

In the first year the Arnold Arboretum's Children's Program has been applauded by school administrators, educators, and of course, the children. In fact, a major school system in the Boston area has incorporated the FSE's into their fourth grade science curriculum for the 1984-85 school year as a way to strengthen their plant science component.

By participating in an FSE, an urban child has the opportunity to feel, see, hear, and smell, elements of the natural world. Each child is encouraged to ask questions and then is guided to discover the answers through his/her own observations and investigations.

The Arnold Arboretum's Field Study Experiences are designed to improve the quality of science education by conveying solid scientific content and involving students and teachers alike in fun, hands-on activities.

VII. E. Fortner, Nina. "Exploration Into the Night Environment".
Environmental Education Specialist, Land Between the Lakes - Tennessee Valley Authority, Golden Pond, Kentucky 42231, USA.

This workshop presented a collection of activities that could be conducted while on a night hike. The activities range from flashlight exploration to a deeper understanding of the night environment by participants achieving night vision. This program is highly applicable to all environmental education resident programs and interpretative facilities. Major focus was on heightening sensory awareness, animal communications, and programming skills by enforcing sound environmental education concepts during a time of day which is often under utilized. Each participant received a copy of the TVA-Land Between the Lakes Environmental Education Curriculum Guide: "Exploring the Night Environment".

VII.F. Green, H. David. "Coastal Issues Small Grant Program".
Regional Extension Specialist, NYS Sea Grant Extension Program, 21 South Grove Street, East Aurora, New York 14052, USA.

Environmental and Ecological Illiteracy is the most pressing secular issue addressing the world today. Because of it most of the other world problems, from racism to world hunger, exist. Getting our youth involved with informed natural resource decisions that can lead to better communities is an important task for the formal and non-formal educator.

The 4-H Coastal Issues Program provides small grants to New York's Cooperative Extension Associations to assist in the development efforts which involve youth and the coast. Grants are made available for one year to initiate new and innovative projects concerning the coast. The program over the past two years, with around $4500, has generated over $40000 in support dollars from the local communities applying for the grants. Potential program dollars for continuation number in the hundreds of thousands.

A typical amount awarded has been $750. While proposals covering any coastal issue have been considered, four areas are emphasized: the coastal environment; erosion control, shoreline stabilization, coastal vegetation; nutritional aspects of seafood use; and coastal heritage, recreation and tourism. Although service projects are supported, it is expected that youths participating in 4-H/CI programs will be encouraged to:

1. Participate on an equal basis with adults in the decision making process.

2. Assume a high degree of responsibility for themselves, for the project and for others. It is important that other people in the program depend on each youth to fulfill important responsibilities.
3. Interact with persons different from themselves, e.g., those of different ages or of different physical, mental or social conditions.
4. Make significant contributions to the community and the coast. The significance is based on whether both youth and adults consider the contribution important.
5. Learn both the subject matter and the processes of the coast--political, business, social and educational--relative to the specific program.
6. Concentrate on a goal over a period of time. This is a skill discouraged in schools by the constant changing of classes. It is important that participants have the opportunity to reflect upon their experiences in order to help integrate them into their base of knowledge.
7. Have the opportunity to fail, and to learn from that failure. Adults often claim that one can learn the most not from success but from failure. With youth, however, we try to guarantee success, either by selecting tasks that are too easy or which entail little risk, or by doing too much for youth instead of with them.

The program has initiated mariculture projects, marine recreation projects, water quality investigations, and wildlife inventories. Three such funded projects are of particular interest and will be discussed in this presentation.

Queens Catherine Marsh Wildlife Inventory

The Queens Catherine Marsh Wildlife Inventory Project developed and conducted an inventory of wildlife associated with the newly installed open water areas in Queen Catherine Marsh to assess the impacts of the improved habitat on wildlife and to aid NYSDEC in their management of the marsh. Members of the local junior naturalists club and the seventh, eight, and ninth graders at the local middle school undertook the year long inventory and shared the results with the NYSDEC, the Friends of Queen Catherine Marsh and other interested people. Cornell University's Natural Resources staff was actively involved with the project. The successful inventory will be conducted periodically in the future in cooperation with Cornell, NYSDEC and other local agencies, groups, and colleges.

Hard Clam Rafting: Mariculture Project.

Agriculture has been a traditional source of 4-H projects. Mariculture is the culturing of marineorganisms in a controlled environment. In coastal communities, mariculture may prove to be a viable source of 4-H programming and a source of income to the community. On Long Island the mariculture of hard clams provides the opportunity for clam fishery which provides many economic and recreational benefits to New York State. However, the hard clam fishery is in the state of decline. Methods to increase the stock of hard clams are needed. One experimental technique is the raising of the clams in rafts. The youth, by growing clams in rafts, had the opportunity to work on an important community issue, to provide scientific data to researchers, and to explore marine careers. Some twenty 4-H teens were involved in the project that was located at the SUNY at Stony Brook under the watchful eyes of fisheries biologists from Stony Brook and New York Sea Grant. Since that time other projects have been launched in other areas of Suffolk County Long Island.

Sport Fisheries Clubs

Taking advantage of the natural ability of fishing to recruit kids into youth groups, this pilot combined Natural Resources and Recreation focusing on the marine environment.The development of 4-H sport fishing clubs was believed to be a great way to generate greater interest among youth in marine issues. Sport fishing is a subject area that can help attract all types of people to the study of the environment as it is a life long sport that can be undertaken cheaply without interference from either artificial or real barriers. In addition there is an ample supply of adult leadership. On Long Island, the site of the project, over 50 adult sport fishing clubs exist. In this program 25 youth took part in a sport fishing project taught by volunteer expert anglers and were taught related science and environmental concepts by university and extension specialists. Since the initiation of this project the Department of Natural Resources at Cornell and New York Sea Grant have decided to make it a state wide program with several years and thousands of dollars of support.

The Coastal Issues Small Grant Program must be judged a success if the criteria of perceived value to the local community and additional dollars of support (as well as number of hours of volunteer time) are taken into consideration. The projects generated have been good to outstanding and each has gained immeasurable support. One cannot underestimate the impact of the Clam Clubs on their communities and the warm acceptance by the Baymen and local government. Sportfishing Clubs may have the ability to attract hundreds of thousands of youth to learn about the waters of New York State. The Queens Catherine Marsh study will give a group of Schuyler County youth the opportunity to work with their parents and adult leaders to make decisions about a piece of their environment. These and the other Coastal Issues projects are giving youth the opportunity to learn success and failure hand in hand with the adult leaders and experts of their community. Whether this work will aid in the development of an informed adult population in years to come is still to be know. But it is the opinion of this presentor that it will, and that the problem of environmental illiteracy will be lessened to a certain extent.

VII.G. Harding, Karen. "Interconnectedness: The Emerging Paradigm". Instructor, Ft. Steilacoon Community College, 9401 Farwest Drive, Tacoma, Washington 98498, USA.

To most people the view of the world that is used in science seems very far removed from their everyday life. In fact, science has a profound effect on how we view the world around us. Each day we are exposed to millions of bits of information, yet we choose to pay attention to only a very few of them. Were we to attend to each bit of information that presents itself to us we would quickly be overwhelmed. Rather than arbitrarily choosing one bit of information over another, we typically attend to those bits of information that fit into a pattern. The pattern that I am referring to is our view of the world: our paradigm. Recent findings in science are suggesting the need for a revolutionary change in our paradigm concerning how the world is organized and how it operates.

At least since the time of Newton we have tended to view the world as a collection of separate entities. We expect that the apple that fell and hit Newton on the head would have fallen in the same manner and at the same velocity regardless of whether or not he had been sitting under the tree. The fact that he was sitting under the tree had no impact on the behavior of the apple. We assume that the entities that make up the world have a set of properties that are attributable to the object itself and act to separate the object from its surroundings. This view is the scientific view of the world and also corresponds to our common sense view of the world.

During the twentieth century a number of research findings in environmental science, brain research and particle physics have called this well-accepted worldview into question. A change in our worldview will affect each of us as individuals and will also affect our social institutions. I have chosen to focus on the scientific findings that show a need for this paradigm shift and then discuss changes that it will bring about in the practice of education.

The need for a shift in our thinking that will include the importance of interconnections is very apparent in ecology. Ecology is a fairly new discipline and includes as one of its basic tenets the idea that objects are more appropriately viewed in terms of their interactions with other objects than as a collection of separate objects. With this as a basis, the field of ecology has led us to new insights about the inner workings of nature. One brief but familiar example involves the use of the pesticide DDT. When DDT was originally used, only the direct effects of the pesticide were considered. It was only later that we became aware of the effects of the biomagnification of DDT within an ecosystem.

The field of ecology has been considered by some to be a special case by virtue of its emphasis on interconnections. But, in the twentieth century the idea of interconnections has become increasingly important in other fields of science such as subatomic physics. The field of subatomic physics is the current focus of man's long term search for an understanding of what the world is made of and how it is all held together. Early in the nineteenth century there was general agreement that the atom was the most basic part of matter. Later in that century it was learned that atoms themselves were made up of something even more fundamental: protons, neutrons and electrons.

All of these sub-atomic particles exhibit unusual behavior. For example, the electron appears not to have any properties until something interacts with it. The type of properties that are seen depend on the nature of the interaction between the experimenter and the electron. This conflicts with our common sense which tells us that an object has a certain set of properties regardless of whether anyone interacts with it or not.

Just as an electron appears not to have any definite properties until one interacts with it, the same may be true of the universe as a whole. As an example, one of the current theories of brain structure and function suggests that the properties of the universe arise as a result of individual's interaction with it. This idea is a result of the work of Karl Pribram, who after many years spent studying the brain, has proposed that the basic structure of the brain is holographic. Pribram sees the brain not as an intricate set of wiring but instead as a pattern of interacting waves. His theory proposes that patterns of interactions within the brain itself interact with the wave nature of the universe to produce patterns that we then recognize as objects. This theory implies that the interactions between the brain and the universe are crucial and in fact that the brain helps to determine the nature of the universe.

These descriptions, although brief, do point out the increasing emphasis that is being given to the idea of interconnectedness in three widely divergent areas of science. A shift in our paradigm to include the idea of interconnections will have major impacts throughout our society and will certainly be felt in the field of education.

Education and educational practices are themselves caught up in the idea of separateness. Examples include the separation of academic disciplines from one another, the attitude that the most appropriate way for learning to take place is for the instructor to talk and the student to listen, and the feeling that a students's personal life has no place in the classroom. A perspective that sees interconnections as fundamental show us that an individual's personal life and self-image are closely tied to his or her ability to learn. Most of us have seen examples of the effect on an increase in self-confidence on someone's ability to master the material being studied.

In addition to confidence, context is also important. The importance of context goes beyond the need to present topics in such a way that the relationship of one topic to another is apparent. If the learner is aware of the relationship between the topic under study and the rest of his life, the learning process becomes more effective. The level of personal motivation also is very important. When we are personally motivated it is not only easier to learn it is also easier to remember.

In thinking back to what is remembered from our own schooling, certain things stand out. For most of us, the items that stand out are those that were presented in some manner that was out of the ordinary. These experiences help us remember things in a way that is not just "mental". The sense that a baker has of how to bake bread is very different from that of someone who has only read a bread recipe. The type of learning that takes place when one actually experiences the making of bread is often ignored in the educational system. We, as instructors, often expect students to learn how something happens by just reading about it or listening to a lecture. Including activities other than reading and listening in a classroom will have beneficial effects on learning. The use of visualization, relaxation, and body movement techniques help the learner remember in ways that purely mental exercises do not.

Cross-disciplinary courses are yet another way in which the idea of interconnectedness can be incorporated into the educational system. Although this is not a new concept I am suggesting a new approach. Most often a cross-disciplinary course involves instructors from a number of different disciplines all looking at the same problem. Too often the student is expected to do all of the integration of one subject area with another. What I am suggesting is the actual integration of a number of different subject areas into one course where the integration of subject areas is as important as the content of the course.

Few educators would argue with the need to integrate the body of information that a student is exposed to into some sort of coherent scheme. What is needed therefore is a commitment to bring this about in the classroom and a sense of how this can be accomplished. Guidance can be found in an analysis of the need for a shift in our paradigm concerning the nature of the world and how it operates. If we see the world as a coherent whole rather than as a collection of separate parts, we will be better able to share with others our understanding of the interconnections between different subject areas and their different ways of looking at the world. The need for a viewpoint that focuses on interconnections is receiving support from a number of fields of scientific endeavor and will have a major impact on the field of education.

VII.H. Hopkins, Charles. "Incorporating the Built Environment in a Comprehensive Environmental Education Program". Boyne River Natural Science School, 19 Grenadier Heights, Toronto, Ontario M6S 2W5, Canada.

(Text is not available)

VII. I. Kennedy, Carolyn L. "Strategies for Involving Youth in Wildlife and Environmental Issues". Director, Elliott Wildlife Values Project, Girl Scouts of the USA, 830 Third Avenue, New York, New York 10022, USA.

The workshop introduced the materials available from Girl Scouts of the USA for wildlife and environmental education. Through research and role-playing, the participants explored the depths and complexity of a variety of environmental issues of this process, students can learn skills necessary for active participation in resolving environmental problems.

VII. J. McDonald, Kevin. "Community Environmental Education in New South Wales, Australia: Issues, Strategies and Challenges". President, Association for Environmental Education (N.S.W.), P.O. Box 144, New Lambton 2305, New South Wales, Australia.

There seems to be an assumption in much of the literature on environmental education that education about, in and for the environment is the preserve of formal education systems. Where it is conceded that education of the total community regarding environmental phenomena and issues might be undertaken, it is assumed that the methods and strategies of formal education are applicable. This paper proposes that: (1) E.E. of the adult (non-school) population represents a vast area of neglect, yet of enormous potential; (2) traditional educational methods, techniques and strategies of the formal education system are not particularly relevant or acceptable to the adult community; (3) community E.E. initiatives should not, in general, be publicy referred to as "environmental education", but rather be promoted under a suitable banner which is appropriate for the particular time, event, place and people involved.

Although the writer feels that there has been an improvement in society's regard for the environment, it is clear that streets still tend to be littered, streams continue to be polluted, soil erosion is occurring on a massive scale, freeways proliferate, noise irritates millions of people, glass and metals continue to be buried in sanitary landfill operations, trees are being felled at an alarming rate, and so on. Hence this paper addresses the questions: (1) how might the community be "better educated" concerning environmental issues, and (2) if the methods of the formal education system are not appropriate to the adult community, then what alternative methods and strategies might be used? The paper examines those attributes of the adult community which make the approaches of formal education unacceptable. Attention is drawn to those particular environmental issues which affect the individual directly and for which appropriate skills and strategies necessary for effective community participation are lacking.

A case study will serve to highlight a procedure and strategies which were particularly effective in a public education program. The issue concerned public participation in sewage disposal options for the city of Newcastle (New South Wales). The relevant responsible body (the Hunter District Water Board) appointed a Community Educator for a four-month period to inform and involve the public in the Board's decision-making process. The paper describes how the educator proceeded with the project and how lessons were learned in the course of the public education exercise. The program was highly successful and possessed the following attributes:

- used only one paid person
- was very economical in terms of money spent for interest obtained
- involved many resource people in the community
- reached many thousands of people (e.g., at "open days")
- raised immense public interest generally (e.g., press letters)
- derived excellent media support (was seen as a "good story")
- resulted in a detectable change of opinion
- witnessed a more positive, informed attitude develop towards the Water Board and its problems
- increased the level of public knowledge (e.g., regarding problems of engineering, concept of coliform counts)
- was seen as a democratic process by many people in the community
- resulted in a reduction of conflict and tension in the community

Other case studies involving the Association for Environmental Education (N.S.W.) working at the community level include: the Wyong Valleys Study; the work of an environmental education coordinator on the Central Coast; the management of wetlands and small farms; observance of 1982 Year of the Tree.

Resulting from some experience with community involvement in environmental decision-making, it has become increasingly clear that each issue "stands alone" in many respects. It is not possible to have one formula, or one model, for dealing with various environmental issues in the community, even though there is certainly a suite of specific strategies which might be mobilized where appropriate. It has to be remembered that each case is different: the issue is different, different people are involved. With few exceptions, people are only "turned on" when they are directly affected by a particular issue, usually only in their own community. There is something of an "ambulance service" character for community environmental education. The reality is that the real community needs are "out there" in that community. It is not a scene of classrooms, chalkboards, overhead projectors, and erudite lecturers.

Thus a set of postulates emerges for community E.E.:

1. adult (non-formal) education is concerned with a clientele which cannot, or prefers not to, meet the terms and conditions or products that are marked in formal mainstream education;
2. there is no one best method of adult (environmental) education; it is an entrepreneurial activity responding to individual needs in unique ways, utilizing all the community's resources;
3. there is no one overall body which the public identifies as a contact point for informed environmental information.
4. it is not helpful to talk about "model" programs; each program is designed for a "one-off" occasion to handle the unique need by the best-in-the-circumstances provision at the time.

An important message for educators is highlighted: Community E.E. programs need to be carefully aimed at the needs of specific audiences, conducted at appropriate venues (some of which might be quite unusual), and timed to receive maximum public acceptance. Everyday citizens do not comprise a "captive audience" as do school or college students. The community educator must be skilled at assessing the appropriateness of time, place, event and target audience.

The concepts of "trickle" and "surge" educational programs for the community in response to reacting to environmental issues are also important. By "trickle" E.E., the writer means the provision of on-going, adult education courses, classes, seminars, field days, camps, etc., open to the public throughout the year, and conducted through various agencies including Adult Education Boards, University extension programs, and local conservation/environment organizations. By "surge" E.E., the writer means something which currently does not exist, at least in the Australian setting: the appointment of paid community educators - personnel skilled in adult education procedures and approaches, and having, as a secondary, but important consideration, a strong interest in environmental matters. First and foremost, however, these people must be EDUCATORS.

The question is examined: which is the appropriate employing authority? Several possible "contenders" are ruled out for various reasons. Two possible bodies (at least for the scene in this State) are the Department of Technical and Further Education (T.A.F.E.), and/or the Board of Adult Education. The point is made that not all trained teachers will necessarily make effective community (adult) educators. The task needs a person with entrepreneurial skills, and a flair for an integrated, holistic approach to learning. Community E.E. is a very special vocation. Many excellent environmentalists would not necessarily make good environmental educators. However, doubtless some would.

The paper then looks briefly at some strategies for effective community E.E. and draws attention to the outstanding contribution made by some innovative people in this field. The pioneering work of Professor William Stapp of the University of Michigan is highlighted. Challenges for the future are indicated.

In New South Wales the Environmental Planning and Assessment Act (1979) of State Parliament enabled public input into the environmental decision-making process. Although this legislation is greeted with some enthusiasm, the criticism is made that the citizenry is yet to be equipped with the knowledge and skills for adequate and meaningful participation. Attention is drawn to the establishment, in 1983, of the Environmental Education Advisory Committee. This government committeee has produced its first Report: The Scope of Environmental Education in New South Wales. The committee has also established a sub-committee to examine community E.E. specifically. The next task to be taken on by the Advisory Committee will be the drawing up of a State Plan for E.E. in N.S.W. Although New South Wales is the first state in Australia to instigate such a development, we are far behind the United States of America where State Plans for E.E. have been in existence for most States for some ten years.

There have been some encouraging developments and events in New South Wales, including the very successful third National Conference on Environmental Education held in Sydney in August, 1984. This conference had the theme: "Urban Environmental Education" and brought together, on the one platform, not only educators, but representatives of industry, trade unions, citizen groups, the media, government departments, and various international speakers. The breadth of the Conference proceedings was most encouraging and has made a significant forward step for the environmental education movement in Australia to break out of its former somewhat blinkered view that E.E. was the preserve of the formal education system.

VII. K. Murray, Cam. "Education and Leadership: The Role of Non-Profit Societies". Past Chairman, Outdoor Recreation Council of British Columbia, Suite 100, 1200 Hornby Street, Vancouver, British Columbia V6Z 2E2, Canada.

The Outdoor Recreation Council of B.C. is a non-profit society, formed in 1976. It provides a mechanism through which the interests and activities of organized groups in outdoor recreation, conservation and education can be coordinated and represented to government and industry.

Currently, 42 provincial associations are members of the Council, embracing motorized and non-motorized groups, land-and water-oriented activities and conservation interests. In addition, a number of regional committees address concerns at a local level.

One aspect of the Council's activities has been to foster the safe and wise use of the outdoors. This has been achieved in several ways. Most notable has been the production and distribution of a widely acclaimed series of safety and education brochures covering a diversity of topics relating to the safe and wise use of the outdoors.

More than 856,000 brochures have been printed to date, and the series continues to expand. Its progress has been supported throughout by the provincial government, and its success can be judged by the ongoing demand. In addition, a series of slide/tape packages have been produced. Like the brochures, these are made available to schools, outdoor centres, clubs and others to use as an educational tool. Both are intended to reach a wide audience among the recreation public.

Since its inception, the Outdoor Recreation Council has encouraged programs of safety education, technical instruction and outdoor ethics. The implementation of a leadership program remains an unfulfilled dream, although a Wilderness Leadership Program has been initiated at Capilano College in North Vancouver, by several persons closely associated with the beginnings of the Council.

From the outset, vigorous debate has ensued around the topic of "leadership" with proponents of a diversity of viewpoints - ranging from a "certification" model, on one hand, to a "laissez-faire" acquisitions of leadership skills on a voluntary basis, on the other hand, a debate continuing over the years.

In 1980, the Deputy Provincial Secretary for B.C. suggested that interest among outdoor recreation organizations for a provincial scale outdoor recreation leadership development ought to be gauged, and, that if sufficient interest was evident, further efforts toward the development of such a program should be stimulated. In 1981, the Council assisted in distributing a questionnaire to individuals, associations and educators. 170 responses were received as outlined below:

Existing Programs

- most groups require a "high" or "moderate" skill level of their outdoor leaders.
- the majority of groups set their own standards, about one-third use standards set by other groups.

Needs for Future Programs

- an overwhelming majority felt that a leadership program, encompassing social and environmental knowledge as well as core skills, would be useful.
- respondents indicated the following preferences for program delivery:

First choice:	Short Courses	28%
	Intensive 1-3 week course	21%
	Certification program	16%
Second choice:	Short Courses	32%
	Visiting groups of experts	24%
	Self-directed module	18%

British Columbia does not yet have a provincewide program for outdoor leaders, and the arguments for and against conservation continue. In this context, it is interesting to note the solutions reached in other parts of the world.

In Nova Scotia the result of a long study into leadership was the implementation of the Nova Scotia Outdoor Leadership Development Program (NSOLD). It is designed to provide a basic leadership training program, encompassing general outdoor recreation skills. Certification was rejected as inappropriate. The certificate gained therefore evaluates efficiencies and deficiencies, rather than providing a seal of approval. The NSOLD Basic Leadership Course includes five weekend modules (woodmanship, wilderness ethics, wilderness navigation, survival and emergency procedures), capped by a nine-day Outdoor Leadership School. All modules are based on direct experience.

New Zealand has also rejected certification. The New Zealand

Outdoor Training Advisory Board places emphasis on ongoing self assessment for leaders, and to this end has produced a detailed manual to provide advice for leaders, instructors and course coordinators. The Advisory Board recognizes three basic principles for outdoor leadership training:

- certification, while perhaps desirable for professional guides and instructors, is inappropriate for the amateur leader.
- leadership training should be based on acquiring technical competence, gaining experiences through practice and developing leadership skills.
- leadership training should be available at different skill levels.

Leadership programs are offered to New Zealanders through a number of organizations.

The Outdoor Recreation Council of B.C. is now looking at the potential for leadership in British Columbia. Response to the survey has indicated that a short course would be the most popular form of delivery. However, any program must cater to individual learning preferences and would therefore ideally offer the course content in a variety of forms: short courses, longer courses, videotape, manuals etc. Nothing can replace the direct contact component, however, and this should be part of any model selected.

It is not the Council's intent to offer certification. Some of the Council's member groups do offer certification, particularly in high-risk activities; however, this is not applicable to all forms of recreation leadership. Rather, the Council would encourage self-assessment, or peer assessment, occuring on an ongoing basis.

The course component would focus on core skills: leadership techniques, outdoors philosophy, human relations, safety considerations and legal considerations. The development of specific skills is appropriately left to the associations.

A proposal will be put before the Outdoor Recreation Council of B.C. to establish a Leadership Training Advisory Board. This Board would be responsible not only for developing core leadership courses, but would also be in a position to enhance leadership training through work-shops and other information dissemination. In addition, the Board would develop responses to leadership issues, such as those raised by the questionnaire respondents.

VII L. Vallentyne, John R. "Globes as Symbols of Oneness." Senior Scientist, Department of Fisheries and Oceans, Canada Centre for Inland Waters, P.O. Box 5050, Burlington, Ontario, Canada L7R 4A6.

Globes provide an opportunity to see a model of the Earth at once as a whole in a manner that is not possible on maps or even in photographs from space. Because of this they have immense power in shaping the way we see ourselves in relation to people in other cultures and to The Biosphere. As hollow spheres, globes resemble The Biosphere more than the solid Earth. Planar projections, no matter how refined, are distortions.

In depicting the oneness of humanity and The Biosphere, globes may be crucial to the success of The World Campaign for The Biosphere (Anon., 1982 and Davis, 1983). By providing a wordless image of The Biosphere, they transcend the need for language and translation. Furthermore, they are capable of stirring human thought and passion. Consider, for example, the following:

- a small globe held in one palm, to suggest that the fate of The Biosphere is in human hands;
- a medium-sized globe cupped in two hands, to suggest the preciousness of The Biosphere;
- the fingers of one hand stretched over the surface of a larger globe, to portray the environmental ravages of humanity;
- a globe swinging on a string like the pendulum of a grandfather's clock to indicate that time is shortening, that not to act is to act;
- carrying a globe on one's back as an expression of the bond of feedback between person and planet;
- a globe with a heart-beat, symbolizing The Biosphere as an independent living-breathing agent;
- a globe with a slot for secret messages or contributions to some worthy supranational cause. (One such globe brought in contributions of U.S. $102 from attendees at the NAEE Banff Conference to the Indian Society of Naturalists.)
- a globe that magically lights up in response to hearing about good ecological actions on the part of children;
- looking up to a globe held high in one hand, indicative of respect;
- a geophysical globe to show patterns of circulation of air and water.

These are some of many ways in which globes can be used imaginatively to communicate important messages and meta-messages about our relation to The Biosphere.

Based on conversations with people from various countries my impression is that in well-to-do nations every primary school is likely to have at least one globe; every secondary school is likely to have several globes of assorted sizes and types. In underdeveloped countries the rule is different. Every secondary school is likely to have a globe, but globes are generally lacking in primary schools. Very little imaginative use is made of globes in primary and secondary schools. They mostly gather dust on shelves in classrooms or on top of bookcases in libraries.

My impression is that there is a certain "magic" in globes for children in the age range of 5-10. It could be that there are windows in the minds of elementary school children into which Biospheric messages can be inserted; and that after a certain age the windows are shut tight and bolted. If true, particular attention should be given to making possible and improving the use of globes in elementary schools.

On the above information and conjectures, it seems to me that two first and most essential educational objectives of The World Campaign for The Biosphere should be: (1) to stimulate governments in all countries to ensure that every elementary school has at least one globe; and (2) to produce a small booklet available in many languages outlining ways in which teachers at all levels might imaginatively use globes to stimulate a Biospheric ethic. The cost of globes is not excessive. The price in North America ranges form less than $10 for a 30 cm inflatable globe to $100 for a beautiful 30 cm plastic geophysical-political globe with an internal 25 watt light. Balloons could be even cheaper substitutes.

Attention is now being given in many parts of the world to implementing an ecosystem approach to living in which we see ourselves as parts of larger systems, rather than as separate agents looking out at external environments. To the extent that this attitude depends on person-plant viewpoints, it could be that governments and other national or sub-national forms of organizations may be able to advocate but not to implement an ecosystem approach; that only people, individually, can do it. If that is the case then environmental education should begin from the top-down (Biosphere to person) as well as bottom-up (person to Biosphere). Globes, as the flags of The Biosphere, are essential in both respects.

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VII.M. Yandala, Deb. "The Church as an Example of Nonformal Environmental Education." Director, Miami Valley Outdoor Ministries, 3304 N. Main Street, Box 506, Dayton, Ohio, 45405, USA.

Every day people are faced with making decisions that in some way effect the environment. Energy use, the food system, transportation and other issues interface with the daily lives of citizens of this world. With an increase in the complex relationship of technology and natural systems comes the need for a greater understanding of the environment. Environmental literacy is essential for all people and not just for those in positions of power.

Many quality environmental education programs have been developed in schools to help facilitate the awareness and skills of young people to make informed decisions. Yet there are many still not reached with environmental education programs. While some people may choose to attend programs at nature centers, museums, zoos, etc. or use the media to gain information, there is a need to broaden our perspectives, and therefore our offerings, so that more people might become informed. Agencies not normally thought of as environmental education resources may have the ability to reach diverse audiences. The church can be such an agency, providing environmental education in a nonformal setting.

Ideally, environmental education can be a mixture of formal and nonformal learning. This would allow for lifelong learning to develop awareness and concern. Nonformal education provides the core of many adult educational systems around the world. Planners in a wide variety of settings are coming to realize that an effective national education system must be a mixture of in-school and out-of-school educational processes. Nonformal education can be complementary, supplementary or a replacement, depending on the situation.

With increased learner involvement and motivation, such programs can have long lasting effects. The opportunity to use innovative learning styles, to provide experiential learning, and deal in the area of beliefs and values can make nonformal education a valuable tool for environmental education.

Churches generally put major emphasis on religious education. They are dedicated to education for youth and adults, to help share faith and beliefs. Religious education also often stresses giving people tools for living as people of faith in the world. These tools center around many lifestyle issues: health, peace, justice, food, family concerns, interpersonal relationships, etc. Educational programs attract youth and adults, both separately and together for a variety of learning experiences. True to the definition of nonformal education, learners (other than young people in traditional "Sunday School" learning programs or specific training programs) have choice over their topics, but churches, either through teachers or published curriculum, provide the "hows" and content in their instruction.

Many church programs already touch on environmental education. A recent study showed that environmentally-related issues receiving the most attention through church educational programs are world hunger, lifestyles, land stewardship, conservation of energy, and environmental ethics. Use of the printed word is the most popular form of addressing these issues (Yapole, 1983). Because the church works with a variety of people, many people may not choose to be exposed to environmental education in other settings. For this reason alone, churches need to consider their role in preserving the earth. Environmental education professionals and religious educators agree that churches need to be in the business of environmental education. In a recent survey, 99.1% of the church officers polled and 99.1% of the National Association for Environmental Education members polled strongly agreed or agreed with the statement "Part of the mission of the church should include a concern for the teaching of environmental responsibilities" (Yaple, 1983).

Churches, both on a local and a national level, can provide a healthy arena for dealing with the affective part of environmental issues. Values, beliefs, and attitudes can be safely discussed in churches, partly because of the expectation that religious education will indeed deal with the affective domain. While knowledge about the environment may be presented, the opportunity to carefully look at lifestyle questions, global issues, community involvement, and personal decision making through values education and studies rooted in faith issues, makes the church a valuable educational setting.

Another major contribution the church can make is to provide reinforcement for what is being learned in other settings. Especially for young people, if that which is presented in schools is reinforced in other places, education can become more deeply rooted and provide greater potential for change. Churches and other community based agencies can reaffirm knowledge and content areas in addition to stressing the affective domain.

Environmental education also has certain principles and characteristics which overlap with the purposes of religious education. E.P. Hart applied a criteria or importance of key environmental education characteristics in environmental education literature. He found among the ones mentioned most often were: interdisciplinary, multilevel, global ethics, concepts, process development, problem solving, values clarifying, systems thinking, first hand experiences and activities (Hart, 1981). Many of these can also be found in religious education. For example, it is definitely multi-level and includes both concepts and process development. Global ethics are important to many denominations who take world mission and outreach seriously. Problem solving and first hand experiences are reflected in a service orientation. Where some of these characteristics are not present, perhaps religious educators might gain from environmental education, especially with its experimental approach.

The theory of humanistic education has strong ties with religious education. Differing from secular humanism, humanistic education emphasizes values, beliefs, attitudes and the affective domain in suggesting styles of teaching and learning. The overriding concern of attitude formulation is important to both humanistic education and environmental education. John Miles suggested that there is a need to recognize the role of humanistic education in environmental education. Consider Miles' definition of a humanistic person: "...a humanistic person is one who is empathetic, who seeks to understand other people's feelings and ideas and is able to do so. Such a person is also compassionate, sensing the needs of others and responding to them with support and assistance" (Miles, 1979, p.177). Religious educators strive to help develop values based on religious principles which are humanistic, according to this definition. Environmental educators need such people so that there are citizens and decision-makers who are concerned about the welfare of all humanity.

The long range goals of both religious education and environmental education includes an emphasis on improving life on earth. They also both are "causes" in that followers are convinced of the "rightness" of what they believe and are eager to share it. Both are spiritual in the depth and morality of what is being taught. Perhaps James Swan says it best; "Ultimately, living in harmony with nature is an energetic phenomenon which involves a harmonious attuning of human life, body, mind and spirit with nature. A holistic view of human nature requires that the spiritual nature of humankind be considered as well as the material aspects" (Swan, 1978, p. 47). The "other-centeredness" of religious education and environmental education along with the concern for that which is not human-made, lend to a spiritual sense of the work that both are about.

Once religious educators accept a rationale for their involvement in environmental education, be it for ethical, theological, or educational reasons, then the potential for types of involvement can be realized. Perhaps the most obvious place for inclusion is at church camps. Camps provide a place where people can come into direct contact with the earth because nature study and outdoor living are usually parts of most camp programs. Be it through the camp's curriculum, through special programs, or interest sessions, environmental education can be effectively shared in the outdoor setting. Perhaps even more exciting in terms of education potential is the opportunity for camps to model environmental concern, through their buildings, food service, resource use and the commitment of the staff. Camps provide a good opportunity for people with experience life-styles that are compatible with the environment and sensitive to global needs.

Environmental education can be incorporated into the ongoing educational programs of the local congregation. Sunday school, vacation church school, youth programs, adult education and special programs may deal with environmental issues and ethics. Service projects, such as recycling, gardening, and picking up litter can reflect environmental concern. Such a simple thing as recycling church bulletins can provide a witness to members and to the community. Congregations can use their own theology and practices to be models to the community of commitment to the earth.

The church buildings, congregational meals, educational programs, worship and special events can all serve to involve people in environmental concern and reinforce within them the importance of caring for the earth. The church can effectively provide people with motivation and tools for changing behavior and lifestyles in order to preserve the environment.

Environmental educators can gain greater effectiveness in their mission as they seek to work with nonformal agencies, especially those who are not normally aligned with this field. Religious educators can broaden the perspectives of their programs by taking advantage of the resources environmental education can bring for their purposes in training people to live responsible lives. The mutuality of a joint sense of mission in caring for the earth can lead to reaching and effecting more people with a message that is important for the future of people and the earth.

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VII.N. Yandala, Deb. "Values and Environmental Education: A Workshop Model for Training Teachers and Leaders." Director, Miami Valley Outdoor Ministries, 736 Walton Ave, Dayton, Ohio, 45407, USA.

The goals of environmental education emphasize awareness, knowledge, concern, and motivation which lead to working for solutions and prevention of environmental problems. In seeking to elicit concern for the environment, one must take into consideration deeply rooted values and how they effect decision-making and problem-solving. A basic understanding of the value process and specific valuing strategies can be beneficial to teachers and leaders in designing environmental education experiences. Training in values education can also help teachers and leaders be clear on personal values and encourage personal development, particularly in relation to environmental concerns.

Values are enduring beliefs which are prized and considered to be of prime importance to an individual. When a value is activated, certain actions or behaviors reflect the value. Each individual has his or her own value system, which is an enduring organization of beliefs. This system helps individuals make decisions, solve conflicts, and make choices. While a value system is relatively stable over time, change occurs when there is a reordering of priorities. New information or experiences can produce conflict which leads to clarification or reprioritizing, both of which are valuable in an individual's development.

There are numerous ways to work with values in an educational setting. How a teacher or leader chooses to work with values is dependent upon goals, atmosphere, the nature of the group, and specific topics in a given situation. By combining the use of various strategies, the strength of each can be used to complement one another. Strategies used most often with environmental education include laissez faire, inculcation, values analysis, action learning, behavior modification, values clarification, and moral development. Both moral development and values clarification are worthy of in depth study by environmental educators because of their significance to the field. They are given special emphasis in the workshop model.

The workshop model is designed to be a one and one-half to two and one-half day experience for teachers and leaders wanting to develop skills in values education, to examine their own values, and make applications to environmental education. Suggestions are given for those conducting the workshop as well as specific explanations of each part of the model. The model includes valuing activities, mini-presentations on valuing theories and strategies, and group discussions on the application of values education. Guidelines for handling values, follow-up possibilities and evaluation are also elements of the model.

It takes both skill and sensitivity to handle values in a way that is helpful to people. Understanding how one might best approach values in a variety of situations requires a knowledge of valuing strategies and theories on how to apply them. The workshop model is designed to give both content and process suggestions to enable people wanting to incorporate values education into environmental education experiences to do so more effectively.

VII.O. PANEL: "Cultural Resource Management and the Environmental Historian". PANEL MODERATOR: Carroll Pursell, University of California. PANELISTS: Samuel P. Hays, University of Pittsburgh; Martin V. Melosi, University of Houston; Thomas Dunlap, The Virginia Polytechnic Institute and State University.

Environmental historians, it is frequently charged, have devoted far too much attention to parks, wilderness, and wildlife, and not enough to the relationship between the built and natural environment. This panel explored the issue, as well as the responsibility of historians to help protect historic structures and aboriginal sites. The need for cooperation between historians and developers was addressed.

VII.P. PANEL: "Environmental History in the Science Curriculum". PANEL MODERATOR: John H. Perkins, Academic Dean, Evergreen State College, Olympia, Washington 98505, USA. PANELISTS: Thomas Dunlap, The Virginia Polytechnic Institute and State University; Samuel P. Hays, University of Pittsburgh; Joseph Siry, Sonoma State University; Alfred Runte, University of Washington.

How can scientists benefit from a more in-depth understanding of the origin and evolution of environmental issues? What does the environmental historian have to offer the scientist, especially those in the natural resource professions? Indeed, do scientists have a responsibility to teach the historical origins of natural resource debates affecting their respective professions? These and similar issues was the thrust of this panel.

VII.Q. PANEL: "Issues and Interpretations in Environmental History". PANEL MODERATOR: Alfred Runte, Professor, Department of History, DP-20, University of Washington, Seattle, Washington 98195, USA. PANELISTS: John Opie, Dusquene University; Donald Worster, Brandeis University; Linda J. Lear, The George Washington University; Carrol Pursell, University of California, Santa Barbara; Morgan Sherwood, University of California, Davis.

Environmental history can be and often is controversial since the field addresses such emotional issues as whether corporations act irresponsibly toward the environment. This panel addresses the need for care and deliberation in researching such debates, debates whose current context often obscures the search for historical accuracy.

VII.R. PANEL: "The Past, Present and Future of Environmental History". PANEL MODERATOR: Morgan Sherwood, University of California, Davis. PANELISTS: J. Donald Highes, University of Denver; Martin V. Melosi, University of Houston; Lisa Mighetto, University of Washington; Donald Worster, Brandeis University; Alfred Runte.

Environmental history emerged during the early 1970s with great fanfare. Why and how did this happen? What did the field accomplish; what did it ignore or fail to address adequately? Does environmental history have a future in the 1980s and beyond? What are the responsibilities of environmental historians toward their students and their field?

VIII. A. Geil, Mike; Edward Pizzini; James Spivak. "Simulating Competitive and Collaborative Models for Decision Making". Coordinator, Environmental Field Programs, Summer Science Training Program, 465 VAN, University of Iowa, Iowa City, Iowa 52242, USA.

Simulations can be a powerful and effective teaching aid for examining ethical issues and illuminating the skills and interpersonal relations involved in group decision-making. Environmental issues often involve conflicts between various groups. Such conflicts may encompass differences with regard to economic, political, social, religious, and cultural ideologies. Arriving at suitable and acceptable courses of action is often extremely difficult in light of these conflicts. Individuals with widely diverse ideologies and concerns must be able to communicate effectively and work together during the decision-making process.

This workshop allowed participants to become actively involved in a simulation designed to illustrate aspects of both competitive and collaborative models for decision-making. These models were examined within the context of both intragroup and intergroup dynamics. The importance of the individual's perceived role for themselves and for their relation to a group or groups, becomes clear through the course of the simulation. Aspects of group dynamics and human nature are vividly illustrated.

Simulations may be used successfully by environmental educators in a wide variety of settings, including high schools, colleges/universities, national park programs, field studies programs, etc.. The simulation used in this session as well as other simulations, also to be examined, have been used by the presenters in environmental education courses at the University of Iowa, in environmental field study courses, at National Wildlife Summits, and in high school classrooms.

Ideas and hints for effectively managing and developing simulations also were discussed. Participants were provided with several additional simulations dealing with environmental issues.

VIII. B. Henning, Daniel H. "The Role and Neglect of In-Service Environmental Training Programs in International Environmental Education". Professor of Political Science and Environmental Affairs, Eastern Montana College, Billings, Montana 59101, USA.

In-service training programs are basically centered upon the participant within his governmental setting. They provide one of the most effective, economical and practical ways of reaching large numbers of government personnel who will be making decisions relating to the World Conservation Strategy (WCS) over the next few years (IUCN 1980). Yet international environmental education has given relatively little recognition and support to this approach.

It is safe to say that much of the success or failure of the WCS will depend on government decision-makers and their exposure to environmental values and considerations. Dr. David Munro, past Director General, International Union for the Conservation of Nature and Natural Resources (IUCN) has stated, "Although they would be harder to influence, a great deal could be accomplished by facilitating environmental training programmes which reached officials in the middle and senior ranks. With 10, 15 or more years of experience, these individuals will be making the key decisions for the present and immediate future." (Personal interviews with Dr. Munro 1979). Personnel of this nature will be making the major decisions in environmental developmental affairs for the present and immediate future.

It is recognized that many government officials have techno-scientific specializations and backgrounds e.g., engineering, forestry, etc. Through a process of upward mobility, many specialized personnel find themselves in administrative or generalist positions while those advancing in the specialist classifications find themselves making more and more value judgements and human/societal decisions in their various activities. Through their educational backgrounds and training programmes, both categories of personnel may lack sufficient exposure to environmental values and considerations for incorporation into their actual decision-making relative to the WCS.

A major point of the WCS is that various values and alternatives, particularly environmentally sound ones, should be examined and analyzed on a long-range basis in the decision-making process by public officials (IUCN, 1980). A pragmatic and technique orientation in training often places emphasis on short-range and expedient approaches to problem-solving and decision-making; consequently, little attention will be devoted to long-range and in-depth value considerations and related alternatives. As a result, such training contributes little to attaining a comprehensive, internalized perspective which would include exposure to, and analysis of, environmental values and considerations. This would be essential for the implementation of the WCS.

It can certainly be recognized that the immediate needs and specific interests, including techno-scientific concerns, of government personnel require in-service training attention. Supplemental courses of integrative dimensions that are of a broad and general nature are also needed. They would provide perspectives, synthesis and overall analysis of values, considerations and relationships in terms of the environment, society and development. The adage of not being able to "see the forest because of the trees" is certainly applicable here.

With the complex and long-range problems associated with the WCS, there appears to be a definite need for general training in environmental administration to provide an overview. Most government personnel are involved in managing the relationship between society i.e., people, and the environment rather than managing the environment or living resources per se. This former area is usually where the problems and decisions occur, creating a need for an environmental administrative framework. Training in environmental administration, in this sense, could also contribute to better utilization of the social sciences in interdisciplinary approaches.

Training programmes have a special responsibility to educate public officials about value considerations so that their public participation activities, judgements and decision-making can be more effectively employed to determine the long-term, public interest for a given environmental area or living resource. However, public participation cannot be effective, let alone encouraged, unless it has a clear orientation toward value considerations in the administrative process. Comprehensive training for government personnel calls for considerations that deal with perspectives, awareness, knowledge and incorporation of values into public participation and actual administration.

The IUCN Commission on Education, UNESCO, UNEP, FAO, UNDP, and other international organizations have large and challenging responsibilities for stimulating and assisting environmental education activities, including training, under the WCS.

However, environmental education must recognize that personnel in environmental and developmental affairs will be making the important decisions for the present and immediate future of living resources and society. It would appear appropriate that more emphasis be given to in-service environmental training activities in this vital sphere; furthermore, there is relatively little researched or published in the the area of environmental training of governmental personnel.

Adequate attention needs to be devoted to research in this field for more effective training programmes, along with strong emphasis on implementation of in-service training courses and workshops on a worldwide basis. Environmental education and global environmental problems cannot afford further neglect through lack of training.

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VIII. C. Horvat, Robert E. "Energy Education: Past or Prologue?"

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Introduction

The Arab Oil Embargo of 1973-74 was the first dramatic sign of U.S. reliance on imported oil to fuel our economy. In the years that followed, concern for energy and related environmental issues spurred the development of energy education programs.

Now, ten years later, the general public seems to think our nation's energy problems are over. Gas lines and station closings are vague memories, and imported oil has declined somewhat in price. Energy education has lost the national spotlight. But our energy problems are still here, like a sleeping vampire waiting for night. Effective energy education is still needed, even at the elementary/junior high levels.

Unfortunately, most teachers of elementary grades, and many science teachers at the middle/junior high levels have had little background in energy. The need for effective energy education workshops for our nation's inservice teachers continues. One model for these workshops, the Buffalo State program, is the focus of this paper.

Workshop Objectives

With a variety of sponsors, Buffalo State has offered intensive ten day workshops (over three weeks) for elementary and junior high teachers with little or no background in energy education. In general, each program had these goals:

1. - to accurately and objectively convey factual knowledge about the multifaceted dimensions of current U.S. energy problems. This includes the laws of energy, energy conversions, efficiency/conservation, and current and future energy options.
2. - to introduce teachers to the vast amount of existing curricular units, films, and other teaching resources on energy topics at the elementary and junior high school levels

(pre-K to grade 9), including materials available from various states, and local utilities (2).

3. - to demonstrate how energy education may (and must) be infused into current classroom subjects.
4. - to discuss classroom and field energy activities appropriate for children.
5. to develop energy curricular units by workshop participants, and to disseminate the best of these units to other school districts.

Format

30 or 40 teachers are selected each summer to attend the workshops. The teachers represent a wide variety of schools/districts in western New York, and northwestern Pennsylvania. Most of the teachers commuted daily, although inexpensive dorms or other housing was occasionally used for teachers living too far to commute. The teachers received three graduate science credits upon successfully completing the program. They also received a large amount of curricular materials, and generally got quite energized.

The mornings were generally devoted to lectures, guest speakers, and discussions, while afternoons featured hands-on activities. The 1984 program offered separate afternoon sessions for elementary and junior high teachers. An Energy Film Festival was conducted during part of the lunch hour, and after the formal afternoon sessions ended. Each teacher could choose the films he/she wanted to see, and evaluate for classroom use. All of the films were available to teachers free of charge, from our State Energy office, local utilities, or film libraries.

Field trips were an important part of each year's program. Among the various sites we have used is the hydroelectric facility at Niagara Falls, which illustrated the many benefits of hydroelectric power. A wind turbine atop a local publishing company helped to show that alternative energy facilities are becoming more common. A passive solar/energy-conserving home, dramatically illustrated how much energy can be saved when proper construction and pre-planning is done before the house is built. A coal-fired power plant showed how the most common fossil fuel is used to make electricity.

Four instructors had primary instructional responsibilities in the workshops. A geologist, home economist, and elementary science educator joined me in presenting content and activities appropriate for use with young children. Guest speakers included representatives from local electric and gas utilities, and the American Petroleum Institute, Washington. Several assembly-type programs on energy (available for school use) were also presented. One day of the Workshop was devoted to the New York Energy Education Project being developed at the State Education Department.

In addition to guest speakers associated with energy industry, the Workshops also featured a local industrial arts high school teacher who directs a large number of energy-related projects with his students, winning national recognition; a local earth sciences teacher who had his students construct and maintain a passive solar greenhouse at their high school; and a representative of the State Public Service Commission who discussed the utility rate-setting process.

Content

In terms of content, our workshop stressed energy basics, a general overview of energy options, and energy conservation. The course instructors felt these were the most appropriate mix of topics for teachers of children below the high school level, in terms of developing these topics for classroom units. The following topics were included:

- The Historical Roots of Energy Problems
- Energy Basics (thermodynamics, efficiency)
- Overview of Energy Options
  - Fossil Fuels
  - Energy Conservation
  - Renewable Energy Sources
  - Nuclear Power (fission, fusion)
- Economics and Energy Options
- Energy Education Curricula and Resources

In addition to the numerous films included in our Film Festival, three films deserve mention. Swain Wolf has produced a very philosophical film which relates energy use to our society, called "Energy and Morality", used to close each workshop. "Lovins on The Soft Path" features Amory and Lonter Lovins discussing renewable, generally community-based energy production matched to the final use for the energy. Also, a videotape by Dr. Albert Bartlett, titled "Forgotten Fundamentals of the Energy Crisis" (5) explains how exponential growth in the use of any resource (such as coal) will dramatically shorten the time we'll be able to use the resource.

Evaluation

Several evaluations of each workshop were conducted. The first was conducted near the program's mid-point, which allowed us to modify any items causing confusion or consternation before the workshop concluded. The final evaluation, at the end of the last week, was strongly positive in each summer program. The teachers reported that they had achieved their main objectives; to obtain information to use in teaching or energy education projects and to increase their own energy content background. The teachers said they had gotten a lot of good ideas and materials, and enjoyed the instructors and guest speakers, whom they all ranked as good to excellent.

Before and after the Workshop, the participants in the 1983 and 1984 programs completed the *Young Adult Assessment of Energy* developed by the National Assessment of Education Progress (NAEP). About half of the 1983 groups also completed the NAEP survey again six months after the Workshop: a longitudinal assessment of any immediate changes in energy knowledge and attitudes. In general, there were statistically significant gains in teachers' knowledge of energy facts and issues, belief in the effectiveness of personal action, and feelings toward the seriousness of the energy problem/energy tradeoffs. Teachers completing the six month followup survey showed no decline in their observed post-Workshop gains (6)

Future Funding for Energy Education Workshops

Beginning in 1979, Buffalo State has hosted five summer workshops in energy education, for teachers of various pre-college grade levels. After all Federal funding for these type of programs was cancelled in 1982, the Workshop instructional staff decided to try and continue the program--at considerably reduced funding--by soliciting support of local electric and gas utilities--during 1983 and 1984. The interest in energy education in western New York, as evidenced by over-subscription of available seats in the summer workshops, has prompted the utilities to continue their current substantial support for 1985.

Buffalo State's experience in finding new sources of funding, while maintaining academic integrity for these Workshops can be repeated at colleges in other regions, I believe. Your local electric and gas utilities already have in place some type of educational program for schools. They will have a specific staff member (called a Consumer Education Specialist, Director of Consumer Education or something equivalent) who is responsible for energy education. By contacting that person, and discussing your plans, and resources, you may find that government funding is not necessary for successful energy education programs.

Acknowledgements

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VIII. D. Hudspeth, Thomas R. "Utopia Visioning and the Creation of Alternative Futures". Assistant Director, Environment Program, University of Vermont, 153 S. Prospect, Burlington, Vermont 05405

The senior seminar in Environmental Studies at the University of Vermont--the culminating course for all self-designed majors and coordinate majors in Environmental Studies--seeks to motivate students to make a difference, to think globally and act locally, by emphasizing utopian visioning and the creation of alternative futures.

The course first seeks to help students comprehend and make sense of the enormous changes which are occurring in the world today and to clarify the nature of "the environmental problems" in our global society. It then reviews the utopian visions of a variety of individuals, families, communities, and social groups through time, focusing on utopian models that are environmentally sensitive and steady-state in nature. Students then gain experience in "creating alternative futures," or collectively day-dreaming about their desires in a number of areas for the future. Social and environmental change strategies are then considered that empower the students to work backwards from their desired futures to the present and to begin to affect positive changes towards their ultimate goals.

VIII. E. Hunwick, John. "Training Pre-Service Teachers in Environmental Education - A South Australian Approach." Lecturer in Curriculum Studies: Environmental Education, S.A. College of Advanced Education, Faculty of Health, Science and Education, Sturt Road, Bedford Park 5042, South Australia.

What is Environmental Education?

To appreciate what is (and is NOT) happening in teacher education in relation to environmental education, it is first necessary to define what it is.

The author's understanding of Environmental education is based on the 1970 IUCN definition and its development at the Belgrade and Tbilisi meetings. Out of this has come the following significant features which serve as the basis for identifying Environmental Education:

1. recognition and comprehension of the inter-relatedness of the individual, society, and the biophysical environment.
2. a priority for developing values and attitudes as well as for learning the more customary conceptual knowledge.
3. the deliberate attempt to develop the skills necessary for

identifying, investigating and resolving environmental problems.

4. the training in and application of citizenship action skills.

Accordingly, Environmental Education is considerably more than a revamped ecology course or some type of outdoor education subject.

Environmental Education and the S.A. School System

In South Australia the initiative for the introduction of Environmental Education into schools has been taken by the S.A. Education Department. This has been done through its policy document "Our School and Their Purposes" (O.S.T.P.) in which eight curriculum areas have been identified as forming the framework for planning and organising learning experiences. They are:

1. environmental education
2. health and personal development
3. human society
4. language studies
5. mathematical studies
6. science and technology
7. the arts
8. transition education

It is yet to be determined what role "environmental education" will have in the overall framework. It could, more appropriately for this list, change into "environmental studies", and focus only on the biosphysical relationships with the other curriculum areas; or it could serve to draw attention to the inter-relationships existing between the individual, society and the biophysical environment as the use of the term Environmental Education assumes.

The official interpretation yet to be placed on the title "Environmental Education" as part of the curriculum framework, however, will not obviate the need for its expression in schools (and teachers). This is made necessary, if not overtly recognized by the Department, in the four areas identified as having priority in schools. They are:

1. literacy and numeracy
2. communication
3. skills for social living
4. problem solving skills

Separate documents elaborating on three of these priorities have been produced, namely: Literacy and Numeracy, Communication, and Problem-Solving Skills. The difficulties encountered with defining the Skills for Social Living suggest it will be some time before a widely accepted statement is produced. In the meantime, the significant features of Environmental Education are supported and are to be given priority, in determining the school curriculum.

For "Problem-Solving Skills", O.S.T.P. states that "....it cannot be emphasized too strongly that learning is an active process. People learn by doing, whether the doing is hammering a nail, writing a lyric or programming a computer. Learner's need to be able to see the point of what they are learning and need to be able to apply their developing skills, attitudes and knowledge to real situations as much as possible."

In outlining the "Skills for Social Living", the document indicates that

..... "A more generalised social awareness also needs to be developed, so that rational consideration of environmental issues or economic forces in our society is possible. Adjustment to social changes caused by developing technologies such as computers will be assisted if there is some understanding of the relationship between technological and social change... The point here is that schools need to give high priority to the whole area of preparation for effective participation in society.

Preparing for Teaching Environmental Education

For each of the features of Environmental Education the S.A.C.A.E. (Sturt) has something in its pre-service programme that supports it.

In developing a greater awareness and comprehension of the interrelatedness of the individual society and the biophysical environment, three compulsory general studies units are significant. They are:

The Australian Identity
Science Technology and Values
and Power and Decision-Making

In addition, students who elect to undertake studies in the Science and Environment strand are required to take the units.

The South Australian Environment
and You and Your Environment

Such students, along with students majoring in Health, can also elect the Environmental Health unit.

All the afore-mentioned units include an emphasis on developing appropriate values and attitudes. This occurs particularly in Science, Technology and Values, and also in the required Curriculum Studies unit: Sciences. This unit presently combines the study of three S.A. curricula: Science, Social Studies and Religion Studies. It stresses what these curricula areas have in common by focussing on their teaching strategies, particularly those related to investigation or problem-solving. This is reinforced by the students preparing to teach a small unit of work in the schools, based on a theme for which the opportunities to integrate the three curriculum areas, and others, are explicitly made.

In addition, the Curriculum Studies: Science unit, by its integration, introduces the notion that curriculum areas can be defined in terms of their intentions, and accordingly demonstrate how much they have in common and reinforce each other. This is frequently obscured when the curriculum focus is largely on content, and not so much on their concepts, processes, skills and values.

At present, the opportunities for students to apply social action skills to real situations does not occur as a required component in study units that they must take. For example, it does not occur in some of the workshops associated with the required unit Science

Technology and Values, but such workshops are optional choices from a range of offerings.

On the other hand, social action is a required component of the Environmental Health unit, but that is only an optional unit for Science or Health majors.

Finally, just before completing their Bachelor of Education, students can opt for an Environmental Education unit, in which the following topics are dealt with:

1. defining and understanding the nature of environmental education.
2. reinforcing the definition of curriculum areas in terms of their concepts, processes, skills and values, and not so much in terms of content.
3. practice in developing themes for teaching that satisfy
   a. the goals of Environmental Education
   b. departmental policy
   c. curriculum requirements.
4. preparation of a year's teaching programme that included Environmental Education, and how to monitor it
5. developing and applying a framework for Environmental Education in the classroom, based on activities and the Cort Thinking Kit.

VIII. F. Hurry, Lynn B. "Environmental Education and Primary School Teacher Education: Meeting the Challenge of Inescapable Issues". Environmental Education writer/researcher, P.O. Box 458, Mooi River 3300, Republic of South Africa.

The purpose of this paper is to share ideas on primary school teacher education.

South Africa is the most industrially and commercially developed nation in Africa and as a result has many large and densely populated urban complexes. There are also large densely populated rural areas where subsistence land-use practices persist. As a result man-induced environmental degradation in South Africa is evident at both ends of the spectrum. There are types of degration typical of industrial consumer nations (e.g. in URBAN AREAS overcrowding pollution, high crime rates) together with degradation typical of the rural poor in underdeveloped countries (e.g. in RURAL AREAS impoverished soils, energy shortages, high incidence of disease). Furthermore as the human population of South Africa is growing at a rate of between 2 and 3% annum, there is a concomitant increase in the rate of environmental degradation.

Whereas environmental change and some environmental degradation is inevitable both in the urban environment as well as in the rural environment, much environmental degradation is avoidable (CSP:CSIC:1983). There are TWO means available to counteract excessive environmental degradation. These are law enforcement and education. In countries with good records of environmental standards the latter usually complements the former. In countries where environmental education is weak or ineffective, environmental law enforcement is also weak and ineffective.

Environmental education (EE) need not be a formal process. Indeed in most cases it is not. However, there appears to be general consensus in South Africa that formal education processes have great potential for improving environmental awareness. There is a growing demand for compulsory formal education in South Africa and many educationalists see our best hope for improving environmental awareness in the formal education process. (Hurry, 1980 and 1982; Irwin, 1982).

South Africa shares with other African states the challenges of a multi-cultural society with a large range of cultural values, environmental perceptions and levels of (formal) education. This calls for a highly flexible educational system which recognises on the one hand the needs of groups, while on the other maintains global perspectives on the nation as a whole.

Research in South Africa strongly suggests that school teachers are frequently uninterested in or uninformed about, environmental matters (Hurry, 1978; Irwin, 1982). Although teacher education programmes may deal with aspects of environmental education (EE), it is generally poorly dealt with. According to Irwin (1982) teachers in South Africa who are environmentally aware and who include EE in their teaching programmes are 'invariably self-taught in this respect'.

There is a need to improve the environmental education component of teacher education programmes in South Africa. All teachers should receive information and instruction in environmental education as an integral part of their training.

THE SOUTH AFRICAN EDUCATIONAL MILIEU

In order to better understand the discussion contained in this paper a few notes on the South African educational milieu are necessary:

a. At present compulsory education only applies to certain sections of the South African community. There is increasing pressure being brought to bear for compulsory school attendance until the 7th Grade.
b. About 70% of children presently in school are in the 7th grade or lower.
c. School syllabuses in both the junior and the senior phases are controlled from central "core syllabus" committees.
d. Colleges of Education may develop their own teacher-training programmes, but these are controlled in the final analysis either by a university or by an education department.

From the above the following points are significant:

- The large majority of children (over 70%) presently in school are in the primary phase.
- To a large extent it may be expected that the same grade levels

throughout the country are following the same school subject syllabuses.

- Teacher education programmes are similar to each other since they all have to cater for the teaching of "common-core syllabuses.

This paper is based on the universally accepted premise that environmental education (EE) is the responsibility of all school teachers, regardless of their areas of specialization.

The prime goal of all EE programmes is given as the training of environmentally literate people, where environmental literacy involves the development of environmental knowledge and concepts, healthy environmental attitudes, and patterns of behaviour which reflect a concern for the health of the total environment.

With regard to teacher education the goal of environmental education is to produce environmentally literate teachers who have the knowledge and attitudes necessary to be effective environmental educators.

This paper discusses a theoretical model for pre-service primary school teacher education and gives examples of effective environmental education programmes in South African training institutions.

The theoretical model has two components. On the one hand trainee teachers should be encouraged to become environmentally literate, while on the other they need to be trained in the didactics of effective environmental education. The former training is referred to "learning-and responding", while the latter is referred to as the "didactics of environmental education".

In South Africa there is central control of the contents of school syllabi from grade 5 to grade 12, through the Joint Matriculation Board. All education departments base their subject syllabi on syllabi determined by national core syllabus committees. Teacher education programmes need to take cognisance of core syllabi, and, with regard to environmental education, need to train the student teachers to make the best use of all subject syllabi to create environmentally literate school pupils.

South Africa is well placed for curriculum development in teacher education. Since school curricula are similar throughout the country, training college curricula may be more readily compared and contrasted. Progressive colleges such as Edgewood and Johannesburg have become models of EE in teacher education, and with their example other colleges are now considering their own curricula with regard to EE.

Development of EE courses has been hampered by apathy in schools with regard to "new" programmes or projects, but with the recent upsurge of interest in EE that this country has experienced it is hoped that both college and school curricula will be more effectively used in developing a more environmentally literate public.

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VIII. G. Railton, Esther P. "Where are the Jobs for Graduates with Master's Degrees in Environmental Education?"

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Ken Hanley probably found the most interesting answers. Last spring he took a leave to lead an expedition of physicians to study high altitude physiology in Nepal and the Himalayan mountains. Of course that wasn't his first trip overseas, and while there he did his own study of the impact of trekking on the local cultures. He also leads expeditions from village to rock climb in Switzerland, and closer to home to hike into the California wilderness, climb Mt. Shasta or raft the Russian Rivers. That's not all, he and his parents formed a non-profit organization to bring bobcats, eagles and other wildlife into classrooms. He supplements these erratic incomes by teaching adventure courses in a community college.

The graduates to be described in this paper are examples of the people who obtain a master's in environmental education through an option in curriculum in the teacher education department of California State University, Hayward. Their stories should give environmental educators ideas of the scope of opportunities everywhere. As the term education implies, over 50 percent of the graduates are teaching. Most had jobs when they entered the program, but have enhanced their work assignments by being allowed to do special projects or take curriculum leadership in their districts. Some have become administrators or resource teachers. They can qualify for administration by choosing electives in the field. Several have found that private schools offer more opportunity for innovations in outdoor education than the more bureaucratic and suite-shy public schools.

The program has attracted students from other countries. Laroia returned to New Delhi to set up a science and environmental curriculum center while teaching science and is now working for the United Nations. Shieh is a professor in a teacher's college in Taiwan. Aresh, from Japan, is now teaching language in Australia. But Wun Ping Ma became Elizabeth Peoples and teaches senior citizens Chinese culture and oriental cooking in Michigan.

Four graduates direct outdoor education programs. More of these positions have opened recently. Some combine teaching in the winter with outdoor adventure programs in the summer. Special education offers special opportunities to use gardening as therapy, or rock climbing for social rehabilitation. Moreland decided after a master's degree to leave alternative education and obtain a teaching credential and she is now directing a therapeutic play program. Carlston raised thousands of dollars for one district through federal funds to integrate economically hard-pressed and culturally diverse children. Alton directs an American Indian program for two large school districts.

Several find jobs in higher education. Junior colleges have already been mentioned. Taylor moved from being the author's graduate assistant to taking her place while she went on a sabbatical leave to a lectureship in the Recreation Department at San Francisco State. Swift is currently a very successful doctoral candidate at the University of Michigan. Others are pursuing degrees at Stanford and the University of California. Several have been encouraged to teach extension courses at Hayward, their parent college. Miche finds this to be a nice supplement to her work as a special instructor for gifted children in a public school district. Meanwhile she is working on a doctorate in philosophy.

Not all education is done in formal or informal schools. The regional, state, and national parks have hired several of the graduates or encouraged them to get their degrees in environmental education with electives in life sciences. Two of these people have become park directers. Others are in the Fish and Wildlife Department and in forestry. Some work in nature centers and wildlife programs. The rationale is that these interpreters are in most demand for school field trips, therefore it behooves them to understand the organization of curriculum and the psychology of instructional techniques.

Of course a few have used the master's degree to move from formal education to industry. Garrisan uses his curriculum development courses to direct the training program at Lawrence Labs. Two alumni direct personnel training programs in industry; one teaches auto mechanics in a privately owned shop. Reid serves as executive secretary of the Interior Forestry Association. Conversely, others use the degree to go from other occupations into teaching. Cook retired from the Air Force to teach in upstate New York. Rodriquez moved from P&E liason to energy manager for a school district. Schardt and Jaeger moved from volunteer work in school gardens and nature areas to teaching assignments in charge of the programs. However, others have chosen for personal reasons to go into volunteer work. For example, Lawton organized ANTS, a program to train volunteers to lead urban outdoor instructional activities with the schools.

Jackie Gilmore attended the NAEE conference. She is an example of those who have found free-lancing to be most rewarding. She left California teaching to help set up the outdoor education center in Jackson, Wyoming. Now she has developed her original interests of photography and writing to develop slide-cassette programs and children's postcard series about the national parks. Warren Arnold developed his hobby of wood and soapstone carving to achieve recognition and success as a marble sculptor.

The achievements of the alumni, kept current by a newsletter, are impressive. A large number of the graduates now lead Project Learning Tree, Project Wild and other workshops offered through the Oakland Museum and the county Offices of Education. Their influence is significant by their participation in an annual Bay Area Environmental Education Resource Fair. Burnwerth won the Kodak Teacher's Award for her use of the camera to teach primary science. Caruso's junior high students won so many awards at the regional science and energy fairs that he also won the classroom award.

These selected graduates represent about two hundred alumni. They hold all sorts of interesting environmental vocations in teaching, administration, parks, museums, industry, and private pursuits. Environmental educators are an especially creative and interesting lot.

VIII. H. Shewchuk, Terry R. and Joan M. Snyder. "Environmental Biology: Grande Prairie Regional College". Coordinator, Biology Instructional Group, Science Department, Grande Prairie Regional College, Grande Prairie, Alberta, Canada T8V

4C4; Instructor, Biology Instructional Group, Science Department, Grande Prairie Regional College, Grande Prairie, Alberta, Canada T8V 4C4.

Normally Biology 298 - Environmental Biology is offered in the standard lecture/laboratory format in the first or second year of a university transfer program at Grand Prairie Regional College. Since 1981 we have offered an additional section of this course conducted in an intensive two week field trip format.

Students who indicate an interest in taking this course are interviewed and prioritized according to their background, program requirements, past performance in other biology courses, interests and maturity. A maximum of 16 students are permitted to enroll by the end of January.

Two evening sessions are held, in mid-February and mid-March, to outline in detail the course objectives, reading assignments, format, student responsibilities, staff responsibilities, contract construction and expectations. A map-reading assignment, a soils assignment and a population sampling assignment are handed out and these are completed by the student before mid-April. Students are also expected to complete a written contract outlining their objectives and to obtain approval of their contract prior to mid-April.

The actual field course begins in late April. Two days are devoted to equipment orientation, sampling techniques, visiting a local timber harvesting operation and final preparation for travel. The following 17 days are devoted to visiting and examining natural habitats in Alberta and British Columbia. Major stops occur in Jasper, Banff, Waterton, Creston, Kokanee Springs, Osoyoos, Vancouver, Victoria, Nanaimo and Pacific Rim National Park. Arrangements are made to draw upon the knowledge of local experts in industry or natural history suchs as company foresters or park interpreters. During the 1983 trip, at least 18 such external assets were directly involved in providing the group with local interpretation.

The students prepare for such guided activities by prior reading and observation as well as participating in student-prepared seminars on some aspects of the next day's activities. For example, prior to visiting the Columbia Ice Fields, one student presented a seminar on glaciation and prior to visiting an intertidal area another student presented a seminar on intertidal ecology. Guided activities are followed by evening discussions of ecological principles and concepts observed. Students are expected to make field notes, keep a personal log book, and to make a collection of 5 plants in museum condition as part of their minimal course requirements.

During the course, the students are responsible for the following expenses: tuition, books, food and accommodation which has to be paid for (e.g., motels, camping permits). It is estimated that these expenses amount to $350 to $450 per student. The College provides transportation, ferry fees, admission fees and instructor/technician expenses.

Student grades are assigned by the instructor/student contract and evaluation is done by all participants collectively.

Students who have taken the course in the field trip format have indicated that this style of learning the basic principles and concepts of ecology have been most meaningful, realistic and lasting. A number of students have described their experiences with this course as the most significant event in their education in that it has served as a focal point for making future career and educational decisions. The course has also played a significant role in the personal development of students and has provided a nucleus for the formation of very lasting friendships among members of the group.

It is also significant that the instructors of the course have received both encouragement and support of colleagues, administration and the Board of Governors in undertaking to present this course in a uniquely personal way.

IX. A. Andrews, Bill. "Environmental Education: A Moral Base for Decision Making". Science Education Department, Faculty of Education, University of Toronto, 371 Bloor Street West, Toronto, Ontario M5S 2R7 Canada

Environmental problems arise largely from the accumulative effect of the "environmentally-negative" behavior of individuals. As a result, environmental problems can best be alleviated by changing this behavior. Behavior change can be effected through legislative and market incentive methods. Such methods are, at best, of short-term value since they treat symptoms instead of causes. The long-term solution involves the development of an "environmentally-positive" moral base upon which people can make decisions which determine their behavior. This paper described that moral base and the means by which it can be developed and utilized in the classroom.

IX. B. Carroll, James. "Outdoor Education Programs in Metropolitan Toronto Schools." Co-ordinator of Geography and Outdoor Education, Scarborough Board of Education, 21 Chipping Road, Don Mills, Ontario, Canada M3B 1L2.

Where We Are

Toronto, the capitol city of the Province of Ontario, celebrated its 150th year as a city in 1984. The city is the "centre" of a region known as the "Golden Horseshoe" of southern Ontario. This region is inhabited by 3.8 million people and is the most populous area in Canada. Metropolitan Toronto's population in 1984 is approximately 2.2 million.

The city is located on the north shore of Lake Ontario, towards the western end of the lake. Since Ontario has always been one of the major hubs of population and industry in Canada, the city has grown quickly in the last 100 years.

Who We Are

The Municipality of Metropolitan Toronto is a corporate federation that links together the cities of Toronto, Scarborough, York, Etobicoke, North York, and the Borough of East York. It was created in 1953 to provide unified services for the entire metropolitan region as a whole.

The Metro School Board

Education in the metro region is under the umbrella control of the Metropolitan School Board, and Roman Catholic education is in the care of the Metropolitan Separate School Board. The School Board is composed of Trustees from the six area boards plus representatives appointed by the Metropolitan Separate School Board.

An advisory council of directors to the MSB reports to the central board, and its work is supported by a number of staff committees with representation from the various area boards and the School Board. These committees deal with a broad range of topics of metro-wide concern such as outdoor education.

It is as members of this Outdoor Education Committee that this brief and visual presentation is offered.

Education in Ontario

In Ontario, taxpayers support two different systems: the public school system (non-denominational) up to Grade 13 and the Roman Catholic separate school system up to Grade 10 prior to 1984 but now up to Grade 13. Elementary and secondary schools are administered by public and separate school boards made up of elected school trustees.

The boards are governed by the rules and regulations of the provincial government's Ministry of Education. The federal government has no jurisdiction over educational matters in the provinces.

Outdoor Education Committee

This committee meets regularly, and its aim is to help promote outdoor education in the schools of Metro Toronto. All representatives share a common interest in the goals of outdoor education and are involved in promoting this interest within their own school boards.

The group acts as a forum to discuss policies and standards such as safety guidelines, as well as to simply share ideas.

Representatives from this committee also sit on committees established to assist the Metropolitan Toronto and Region Conservation Authority administer residential programs shared between the MTRCA and the Metropolitan School Board.

Formula Financing

Much of what is accomplished in outdoor education comes from the formula financing administered by the Budget Formula Review

Committee. The money which each member board uses to finance its outdoor programs is set by this committee. The amount is based upon the student enrollment in each of the elementary and secondary panels. Other sums are similarly allocated for related activities such as plant maintenance or transportation. Such money is drawn by the member boards based upon the formulae financing but can be used for whatever program priorities the individual board established.

Aims and Objectives

Although there may be slight variations in the programs practised by each of the member boards, all share a common philosophy of outdoor education. This philosophy can be summarized by the following characteristics:

- direct experience
- natural setting
- a living laboratory
- interdisciplinary approach
- experiences, attitudes, skills only obtainable in and applicable to an outdoor setting

As early as 1971, an outdoor education report concerning the number of residential experiences that each student in Metropolitan Toronto should have during his/her stay in the school system from Kindergarten to Grade 13 was made to the Metropolitan School Board.

At present, the Outdoor Education Committee recommends that each student in the period of time that he/she is in school from Kindergarten to Grade 13 have at least two 5-day (or equivalent) residential experiences. It further recommends that one experience be at the elementary level and the other at the secondary level.

Over the past few years since the residential aim was established, most boards within Metropolitan Toronto have expanded their programs considerably.

Perhaps the most important expansion has taken place in the purchasing of land in order to build the board's own outdoor education site. Several boards have either purchased property or shared in the administration of a property with another organization.

The school boards of Metropolitan Toronto can now offer an outstanding outdoor education program.

Individual Board Program

It would be impossible to list the wide variety of programs offered by the member school boards. The handouts accompanying the presentation will give a good description of the programs offered by each board.

In general, most boards offer sites and personnel to carry out a wide variety of day activities in outdoor education. Many boards also offer financial assistance and/or transportation for such programs.

The boards' residential programs are offered at their own sites or on land which is leased. All boards within Metro Toronto use the facilities of the Metropolitan Toronto and Region Conservation Authority under a shared "Agreement" plan with the Metropolitan

Toronto School Board. The MIRCA also operates several sites at which time blocks can be purchased.

The school boards of Metro Toronto make excellent use of either nearby or distant wilderness facilities to expand their residential programs. Large private camps and other facilities are booked by schools which desire different experiences.

Several boards offer summer school programs which often reflect the uniqueness of the environment. These courses can be taken for interest, leadership training, credit, or certification. Courses are often offered for both students and teachers.

Metropolitan Toronto and Region Conservation Authority Programs

The Conservation Authorities Act of 1946 provided the means by which the Province of Ontario and the municipalities on Ontario watersheds could join together as a conservation authority to undertake programs for natural resource management.

Since 1957, the MTRCA has undertaken a comprehensive program of resource management on the watersheds under its jurisdiction. Conservation education was one of the major problems undertaken and it was in this program that the school boards of Metropolitan Toronto became interested.

The MTRCA now offers a wide range of programs in which school boards can participate.

Perhaps the most important program to metro schools is the residential facility program shared with the Metropolitan School Board. As early as 1963, the Authority showed interest in the development of residential programs when a permanent facility was established at Albion Hills. The "Schools Administration Act" enabled boards of education to enter into agreements with Conservation Authorities for the development of facilities for "out-of-classroom" programs on Authority lands.

In 1973, the Authority entered into an "Agreement" for the development and operation of a field centre with the Metropolitan Toronto School Board, the Metropolitan Separate School Board, and the neighbouring York County Board of Education. In 1979, such an agreement was also shared with the development of residences at the Lake St. George property.

Under the "Agreement", provision was made for a "Joint Planning Committee" composed of representatives from the boards and the Authority. A "Program Advisory Committee" also assists in the planning of programs shared between the two parent organizations.

Time blocks, the number according to board size, are divided among the school boards that have signed the "Agreements." Classes of students are then sent to the field centres for a residential experience.

Staff from the "Agreement" school boards are seconded to the centres and provide the educational leadership desired by visiting schools.

IX. C. Clausen, Bernard L. "An Analysis of Teacher Selection of Project Outlook Activities". Associate Professor of Biology, University of North Iowa, Cedar Falls, Iowa 50614 USA

Project OUTLOOK is a new type of environmental education program created in 1982 by a group of Iowa teachers who were experienced in environmental education. OUTLOOK is a curriculum enrichment program designed with an educational philosophy and methodology derived from the research of Piaget and Karplus. Project OUTLOOK implements the concepts of Piaget who identified levels of learning readiness and the learning cycle which was formalized by Karplus.

The project includes 140 enrichment activities written for specific grade levels and is published in grade level sets for K-2, 3-5, 6-8, 9-12. The packets for grade levels K-2 and 3-5 each contain 36 separate activity cards. The packets for grade levels 6-8 and 9-12 contain 34 activity cards each. Eleven topic spheres and six themes were incorporated into the activities.

Project OUTLOOK is sponsored by the University of Northern Iowa, Iowa Department of Public Instruction and the Iowa Natural Heritage Foundation with the assistance of the Iowa Conservation Commission and other state resource agencies.

Project OUTLOOK was inserviced during the summers of 1983 and 1984 through twenty week long workshops offered by the University of Northern Iowa. The workshops were held at the Conservation Education Center which is a field station operated by the Iowa Conservation Commission in Springbrook State Park. UNI science education faculty members were the instructors for the workshops, which carried two semester hours of graduate credit.

Two courses comprised each workshop. During the five mornings, Piagetian theory and its extensions were examined. The five afternoons were devoted to incorporating the OUTLOOK activities into the curriculum of the individual teacher and in conducting some of the activities with peer groups. As teachers worked through the activities in their grade level packet, they shared ideas for implementation and curriculum coordination. The instructors assisted the teachers in perceiving how their subject matter could be extended to the environmental interface between traditional subjects by using the OUTLOOK enrichment activities. Many participants found this effort to be a particularly exciting and beneficial part of the workshop.

The population of participating teachers was somewhat pre-selected by several factors. The field center location attracted those who were interested in the out-of-doors. The workshop announcements tended to be noticed by science oriented teachers because of the Iowa law which requires, as a minimum, the teaching of "conservation and environmental awareness" in the science curriculum and the designation of the workshop for science education credit. Cost and credit hours were attractive. The reputation of the University as a leader in conservation/environmental education was an influence on those desiring to obtain a new program of environmental teaching activities.

The participants reflected a wide variety of teaching positions ranging from small rural school districts to large urban school districts. Some participants were generalists and some were specialists. The age and experience range was wide with some having taught for thirty years and others who were just beginning their teaching careers.

This study includes data from the five workshops on implementing OUTLOOK taught by the author and one section taught by Dr. Carl Bollwinkel. The total number of teachers involved in the study was 231. The teachers were required to select approximately 50% of the OUTLOOK activities from the grade level packet for incorporation in their curricula. The course assignment was to identify the specific placement of each activity selected and to explain the rationale for the placement.

Overall the teachers exceeded the minimum requirements by selecting substantially more than 50% of the activities from their grade level packet.

The median numbers of activities selected by each grade level group decreased from 26 for K-2 to 18 for 9-12. The decrease in medians correlates with increasing levels of specialization. Time and opportunity were primary limiting factors.

In order to determine teacher perceptions on placement OUTLOOK activities in the curriculum, self-contained classroom teaching situations were analyzed as a sub-population. The teacher of a self-contained classroom has responsibility for the subject areas of Science, Health, Social Studies, Language Arts, Reading, Mathematics, and may or may not have responsibility for Art, Music, and Physical Education. Private school teachers additionally may have responsibility for teaching Religion. The self-contained classroom provides the maximum variety of choice in curricular placement of these enrichment activities. It also provides maximum opportunity for multi-disciplinary applications.

The largest numbers of activities were placed in Science, Social Studies and Language Arts by the self-contained classroom teachers at grade levels K-2, 3-5, 6-8. Some teachers were able to cross correlate an activity to enrich more than one subject area at the same time. Many teachers apparently had problems with time sequences in the curriculum which obstructed such correlation between subject areas. Some teachers viewed one subject area as the primary curriculum area for placement of the activity, while the correlated subject areas were considered to be secondary or so obvious that there was not need to identify them. Mathematics and Health were not seen as primary areas subject areas for inclusion of large numbers of OUTLOOK activities although mathematic skills and health concepts were acknowledged to be reinforced by a number of activities. The assignment seemed to start a number of teachers thinking about total curriculum reorganization to more adequately reflect cross correlations.

However, the majority of participants found that a complete reorganization of their courses of study was too much to contemplate during an intensive task oriented one-week workshop.

Selections were distributed widely by discriminating teachers governed by personal needs. The data on activity selection for self-contained classrooms shows each of the activities being selected by at least one teacher for various subject areas. When the opportunity for choice of subject areas is reduced to only one option no teacher failed to select less than 50% of the activities for enrichment of the single subject. For example, mathematics teachers selected 64% of the activities and art teachers selected 77%.

The study shows that 231 teachers in the sample population found the Project OUTLOOK activities versatile and useful. Regardless of grade level or subject area taught, the 140 activities were incorporated into existing curricula at median rates exceeding 57%.

The analysis of self-contained classroom teachers' selections showed the highest placement of activities to be in Social Studies and Science curricula. A large number of activities were also placed in the Language Arts and Reading curricula. Teachers who had more restricted teaching assignments and teachers who were specialists in one subject area generally selected almost as many activities as those who were in self-contained classrooms. The multi-disciplinary applications of the activities demonstrates their usefulness for enrichment of any of the subject areas represented.

The very high levels of flexibility, versatility and utility for the OUTLOOK activities which have been identified in the population of Iowa teachers studied underline the suitability of this enrichment program for at least the entire midwestern region of the United States and probably the world with minor modifications. Other states may wish to supplement with some activities to reflect regional differences. Other nations may wish to develop their own set of activities using the proven methodology and philosophy of the OUTLOOK program. The OUTLOOK program system of curriculum enrichment and inservice training is easily adapted to reflect cultural and environmental uniqueness.

OUTLOOK is a copyrighted program and the OUTLOOK staff is available to assist any state or nation which may be interested in adopting, modifying or developing its own versions. Individuals or teams from other states and nations are most welcome to participate in the inservice workshops.

IX. D. Di Chiro, Giovanna, William Morgan and William Stapp, "Environmental Education and Community Problem Solving." School of Natural Resources, The University of Michigan, Ann Arbor, Michigan 48109, USA.

This environmental problem solving and action research model embodies an ideology and methodology of both educational research and learner investigation. It is rooted in the process of reflection and action, and is the means for teachers to improve their own practice and to help students to acquire knowledge and personal empowerment. The model is also designed to encourage the integration of the basic disciplines within the curriculum, to reflect upon and improve the learning and instructional goals articulated by the school system, and to improve the quality of the bio-physical and social environment through education.

The instructional model functions as two simultaneous "moments" aimed at improving the teaching and learning environment: 1) The Action Research Moment: Conducting classroom-based research to develop an improved teaching and learning environment i.e., developing appropriate curriculum to more effectively link education with real world issues through systematic planning, implementing and evaluating classroom actions; 2) The Environmental Problem-Solving Moment: developing a critically aware and responsive population of young people with the motivation and skills necessary to solve problems of important local social and environmental issues with the aim of enhancing the quality of the social-ecological environment through educational means. The process is designed for students to gain skills and personal empowerment through participation in the analysis and resolution of a community issue.

Major Aims of this Project

1. To develop the understanding that our individual and community actions are connected to human and natural systems worldwide.
2. To promote a cross-cultural direction in education to increase the understanding that we do indeed live and operate in a global society.
3. To improve the learning environment by actively linking education with real world problems and their solutions.
4. To improve the teaching environment by adopting a more critical pedagogy whereby the teacher reflects upon, and critiques the curriculum and his/her teaching practices.
5. To enhance learner responsibility and efficacy in taking committed action to improve their own community and environment.

The Roles of Participants

To promote critical thinking amongst the various members of the project team: teachers, students, administrators, and university personnel (UP). All participants are involved at different stages of the project development and to different degrees.

1) School administrators: principally involved in the initial stage of the project to discuss school system concerns and identify problem areas and trends. They also attend an initial planning meeting with teachers and UP to discuss goals, roles, processes and the extent of the support they are able to offer.
2) Teachers: involved at every stage of the process including initial planning and negotiation sessions with administrations,

designing of the project, implementation, monitoring, and constant evaluation. They should focus on the personal, institutional and political constraints encountered in the classroom in order to work toward their resolution.

3) Students: involved directly in the environmental solving process in the classroom. Also involved in reflection on personal feelings and values regarding the learning process they are experiencing. They should consider different aspects that influence this experience including-themselves, the teacher, the school, the administration, the community, the UP, parents and significant others.

4. University Personnel: involved in initial planning meetings and throughout the process if deemed necessary by participants in the project. Assist in planning, implementation, monitoring and evaluation of classroom activities. Provide suggestions, feedback, and curricular materials, and other resources in support of the goals and directions of the project.

The Components of the General Process

The components of the general process include three steps--the negotiation process, the problem solving process, and the action research process. In the negotiation process, the UP, teachers and administrators meet to clarify goals, roles, classroom processes, and research plans. The problem solving process involves teachers, students and UP and focuses on identification of a socio-environmental issue of interest to the students, fact-finding and information gathering on the issue, formulating alternative action plans, and taking some action to solve the problem. The action research process (which occurs simultaneously with problem solving), concentrates on understanding, analyzing and improving the classroom environment. It involves reflection on teaching practices, institutional constraints to effective education, and designing action plans to improve the situation.

The Implementation of the Instructional Model:

Four pilot-level studies were conducted by University of Michigan researchers in the Ann Arbor Public School System, and another in an undergraduate course at the School of Natural Resources. The projects were undertaken in an elementary, junior high, and high school, in a public school system in a middle-sized community (110,000 population). The elementary school study entitled Community Transportation involved a 6th grade class and teacher for 23-1 1/2 hour sessions over a period of twelve weeks. The facilitators and teacher met regularly to reflect on the project, evaluate the process and plan for the next session. Initial classroom sessions involved identification and assessment of social and environmental problems within the community. Through negotiation and consensus decision-making and valuing processes, the class selected transportation issues as their problem area. Subsequent sessions were concerned with developing and conducting an interview questionnaire to gather information, establishing criteria for selecting a specific transportation problem and interpersonal valuing and group process activities to aid in understanding other viewpoints and making group decisions. The class then decided to research bicycle transportation problem areas and to brainstorm ideas for solutions. Out of this came a process of evaluating alternative routes with previously identified criteria in mind such as safety, economics, expediency, and community access and use.

Some of the project outcomes and community actions that occurred were: development, administration, and analysis of a community transportation questionnaire, setting up a question/answer session with city planner and bicycle coordinator, and writing and circulating a formal transportation position plan.

The junior high school study entitled Civics in Action was conducted through the social studies program in five ninth grade civics classes. Students selected, individually or in groups, a social or environmental problem that concerned or interested them, taking into account previously determined criteria for selection -- interest, available information, learner's ability to affect change, appropriate timeline to impact the issue, etc. Alternative information resources were identified and sought out such as: government agencies, public interest groups and organizations, city officals, etc. The issues selected for investigation gave the students the opportunity to interact with community organizations as their primary source of information. Students chose to research issues such as teenage runaways, child abuse, and drug abuse, rape, crime, recycling, acid rain and nuclear power.

Some of the project outcome and community actions that resulted were: videotaping and broadcasting an environmental debate on community cable TV, publishing letters to "Letters to Editor," writing a column in community newspaper, fundraising, and personal lifestyle change.

The third and fourth action research studies were conducted in a high school science program called Monitoring for Water Quality. The projects involved five senior biology classes for nine 55-minute classes and three advance placement biology classes. The project was designed to work through the process and techniques of testing water quality in the classroom, followed by running each test on the local river. The students ran nine separate water quality tests on the river and calculated the overall water quality index. In-depth discussions of test results led to recommendations on the hazards and potential limits to community uses of the river.

Outcomes and actions resulting from the project included: establishing baseline data for the river so that future classes can monitor the river's changes in water quality, establishing an annual water quality testing program for the community, and submitting data to local watershed council, local governments and public health officials.

Evaluation of the Instructional Model

The action research process functioned differently for the three levels of participants -- learners, teachers, facilitators. The University facilitators decided that there was the need for a redefinition of the facilitator role, the need for more extensive planning sessions with the teacher before committing to the process, and a greater understanding of the institutional constraints to action and community-oriented research in the public school system.

From the teacher evaluations, we were able to determine the institutional constraints to action-oriented classroom teaching, such as time schedules and number of students, as well as the effectiveness and appropriateness of personal teaching practices and training.

Invaluable information was gained through learner evaluations. Students gained increased awareness of their efficacy in having input in community issues, of the ability to achieve success in consensus decision making even when faced with conflicting viewpoints and people with different backgrounds and cultures, of the positive and negative implications certain values have on social and environmental problems, and of the impact of social, political, economic and ecological factors on a community and societal problem. The following evaluatory comments were obtained from the culminating written evaluations.

Comments of students:

"We learned about how to solve problems, we showed a lot of people that we cared, we learned how to resolve their differences."

"You get round to other resources and you find out about different resources outside of the school."

"It helped me to learn to work together as a group."

"I learned a lot from my peers."

Comments of a teacher:

"In the area of mathematics, reading, and language arts, we were able to bring students to real world use. They suddenly had reasons to compute percentages and to grasp the concept. They utilized pie graphs, bar graphs, and histograms. Best of all they had to think critically, communicate thoughts, compromise on various issues, state values and sort through those values. Working through the democratic process was far from being an 'all time' simple task."

For the more critical comments and an analysis of the four initial experiences, we have identified recommendations for project modifications and items in need of further investigation. Aspects of action research that were not resolved as a result of our three studies:

1. Whether learners should be involved in all discussions between facilitators and teacher/administrators in the preliminary action research planning.

2. Whether the goals/objectives of action research are best

achieved by focusing on small-scale projects (school/neighborhood) or large scale projects (state/national).

3. Whether teaching practices are changed permanently as a result of action research.

4. Whether institutional changes resulting from the action research project are permanent.

5. Whether some or all of the following teacher guidelines would be beneficial to the teacher: in the roles of participants; general classroom processes; data collection techniques; principles of procedures; action research case studies; selecting a community project; handling controversial issues; teacher preparation; program evaluation; etc.

6. Whether the facilitators should play a passive, semi-passive, or active role during the action research project.

7. Whether it is feasible to expect a teacher to do action research as a part of his/her teaching practices without outside assistance.

8. Whether it is possible for a teacher to effectively evaluate his/her teaching practices alone, or is a critical community of other teachers/facilitators necessary.

Prospects for the Future:

The environmental problem solving and action research model surfaced a number of issues regarding the realization of EE goals in the formal classroom context. Additional investigation and experience in other classrooms is needed to resolve some of the above issues. Currently, the University of Michigan research team is in the preliminary stages of implementing this instructional model with new school districts, teachers and students, as well as assisting in the negotiations to institutionalize the model in the school system in which it was first conducted.

IX. E. Fensham, Peter J. "New Movements in Science Education: International Evidence of Environmental Awareness." Professor of Science Education, Faculty of Education, Monash University, Clayton, Victoria, Australia, 3168.

Science curricula for schools at both the primary and secondary levels of schooling underwent a remarkable change in many countries during the 1960s and early 1970s through curriculum projects which sought to modernise the teaching of science and to extend it more universally throughout the whole population of school age children.

The new curricula had a number of characteristics. Most, perhaps all of them, emphasized the place of activity or laboratory experience as a more central aspect of the learning of science. For secondary schooling, many of the curriculum projects set out to bring the content of learning more in line with the current understandings of nature that make the sciences such powerful and significant features of humankind in this second half of the 20th century. If these basic understandings of modern science were the content emphasis of the new secondary science curricula, the new primary science curricula very often emphasized those intellectual processes that were seen to be important in the ways scientists go about their work of extending knowledge and applying it to problems in the physical and biological world. Natural phenomena were seen to be excellent contexts to develop in young children to the basic processes of enquiry, of classifying, of measuring, of inferring, of predicting and of so-called problem solving itself.

Regardless of the level of schooling the changes that have just been outlined for science education in schools were reforms that drew their content from analyses of the nature of very pure or academic forms of the sciences. This is hardly surprising since these curriculum projects were almost invariably in the hands of well-meaning academic scientists, science educators (a new breed of professionals within academia) and successful secondary science teachers whose whole socialization, interest and expertise lay in these forms of science.

Nevertheless while these reforms were being implemented in schools, two other movements involving science were gathering momentum. The first of these is the Environmental Movement which began with individuals in a number of countries recognizing that there was very serious deterioration of the biophysical environment in which civilisation and human society exists and on which the more industrialized forms of society increasing depend for energy, food, shelter and consumer goods. Many of these problems such as atmospheric and water pollution, soil loss, resource destruction, and the endangering of species have arisen from the application (via new technologies) of scientific knowledge.

The second movement is known as Science and Society, or as Science, Society and Technology (S.S. & T.). This is a two-pronged response to the negative image of science that has developed among many persons throughout the world. Possible sources of this negative view are the continuous fear of a nuclear holocaust, the involvement of something like 50% of the world's scientists in developing military science, the undesirable side effects of some of the so-called wonder drugs of pharmaceutical science and of the pesticides and insecticides so widely used in contemporary agricultural science, polluting effects of acid rain and of industrial wastes that stem from technological processes that were associated by ordinary citizens with outworkings of science.

The Environmental Movement and Science and Society (or S.S.&T.) are movements that both recognize that there has, in many instances, been a mismanagement of the use of scientific knowledge and that a much more responsible approach to how science is applied is needed if quality of life is to be improved for more and more people and for an indefinite future.

SOME NEW CRITERIA FOR ENVIRONMENTAL AWARENESS

Towards the end of the 1970s and certainly now in the 1980s, there has been a much more informed discussion among science educators about what the Environment or Science, Society and Technology can mean for teaching science in schools. These discussions have produced new criteria for science education that are evidence of growing environmental awareness.

I. A workshop at the Nijmegen Conference of UNESCO/CASE/ICSU-CTS produced a very useful set of characteristics (Table 1) and if applied in the classroom, could enable science teachers to teach almost any science curriculum so that it made a contribution to environmental education. Of course, some curriculum materials do include much more content than others do, that greatly assists science teachers who wish to make that contribution.

A recent production by UNESCO (1984) of two new sets of resources that will assist science teachers to teach their science education more environmentally could do more to accelerate these ideas in practice.

Table 1: Characteristics of Environmental Science Education

1. Environmental Science Education (ESE) is oriented towards a problem.
2. ESE is concerned with realistic situations.
3. ESE aims to elaborate the alternatives that exist for situations and the skill of choosing between them.
4. ESE includes action as an integral component.
5. ESE uses the real environment of the school and its surrounding as a context.
6. ESE involves the clarification of values.
7. ESE aims to increase the ability that students have to contribute to improving their own environmental situations.

II. The UNESCO-UNEP Environmental Education Project (1980) identified five broad areas - Population, Food, Resources, Energy and Ecology that embrace many of the acute environmental problems facing mankind. Each of them has many sub-topics that could be treated within the curricular content of science courses at school. The curriculum workshops in Asia under the leadership of the Asian Programs of Educational Innovation for Development (APEID, 1980) are outstanding examples that have helped many countries in that region to implement this type of content into their primary science curricula.

III. In 1982 a list of topic areas was proposed as a basic core of science learning for all students at schools. Each topic area, to be on the list, had to readily yield in any country or more local setting, science sub-topics for learning which could enhance the quality of the learners' lives outside of school, at home and in society.

The list of topic areas is given in Table 2 and it will be evident that there is considerable overlap with the broad areas of the UNESCO-UNEP Project.

Table 2: Topic Areas for Science Education at School that Can Meet Criteria of Quality of Life

Topic Areas

1. The Senses and Measurement as an extension of the senses
2. Our Universe
3. The Human Body
4. Health, Nutrition and Sanitation
5. Food
6. Ecology
7. Resources (natural and man-made)
8. Population
9. Pollution
10. Energy use
11. Technology (social and personal)
12. Quality of life

IV. Again, the Regional Office for UNESCO in Asia set in motion in 1983 a new APEID project under the title of Science for All (APEID, 1983). This latest effort in the Asia Region to improve science education is based on the belief that Science and Technology and their applications are not part of social science and culture. At both the personal and national levels, health, nutrition, sanitation, agriculture, industry and the improvement of the environment, are seen as fields in which scientific knowledge can be used as a powerful tool for solving human problems. Science education has a role to play in developing in the whole population - scientifically trained personnel and citizens alike - the capacity to use these powers responsibly and to appreciate their potential for good.

APPLYING THE CRITERIA OF ENVIRONMENTAL AWARENESS

How environmentally aware are the new school science curricula? When criteria of environmental awareness are applied to many existing science curricula they do not score at all well. On the other hand, it is possible to point to curricula for science education that do seem to measure up well on these sorts of criteria.

Furthermore, even without wholesale revisions, the content of science education does often offer the opportunity for teachers to include an environmental emphasis in the way in which various topics are taught and learned.

ESTIMATES OF EMERGING ENVIRONMENTAL AWARENESS

To provide some current estimates of how science curricula are changing in the direction of environmental awareness, the opinions of science educators in forty different countries were sought early in 1984.

The information sought was about "the change in student learning experiences" from 1970 to 1984 for each of twenty-three sub-topics, most of which are related to the five broad areas mentioned earlier.

The sub-topics used in the survey are given in Table 3, and are strongly influenced by the list of topic areas in Table 2.

The responses from 33 countries to the survey's sub-topics were given for the three levels of schooling, elementary, junior secondary and senior secondary. Responses could be (i) definitely more learning experiences, (ii) probably more learning experiences, (iii) either estimates of lessened (-) learning experiences and (iv) not sure or no change or not present.

Table 3: The Sub-Topics of the Survey of Changing Environmental Awareness of Science Curricula (1970-84)

1. nutrition in relation to health (not just food science)
2. causes of disease and illness among humans
3. population control
4. population issues in relation to those of food supply
5. health of the human body
6. effective use of water in agriculture
7. water as a key ingredient for human health

FOOD AND POPULATION

8. consumption and conservation of living resources
9. consumption and conservation of non-living resources (minerals and fossil fuels)
10. the place of human beings as integral parts of, and interactive contributors to the ecology of biophysical systems
11. critical conditions of threatened biological species
12. how science contributes to better quality of life

RESOURCES AND ECOLOGY

13. more efficient use of energy.
14. alternative renewable sources of energy for use (solar, wind, tidal, etc.)
15. advantages and disadvantages of nuclear sources of energy for peaceful purposes
16. scientific aspects of nuclear armaments and the risks of nuclear war
17. varieties of pollution and pollution control associated with industrialisation
18. preservation of features of the human historic heritage

ENERGY AND INDUSTRIALISATION

19. technology in society at large
20. technology affecting students as individuals
21. interaction of science and society
22. instrumentation and measurement
23. how computers are changing the nature of scientific work

TECHNOLOGY AND SOCIETY

No single sub-topic had more than 50% of the respondents reporting a definite increase at any one of the levels.

Fourteen sub-topics emerge at all levels with 50% or more of the respondents saying definite or probable increases.

Energy use (sub-topics 13 and 14) and conservation of resources (8,9) are now being considered by teachers of science and all their students (all three levels) fairly commonly, and these topics are joined by others associated with nutrition (1), population health (2,3,4,5), pollution (10,17) and technology (10) in a good many situations. The presence of the sub-topics at each of the three levels means that all students at school, and not just those specialising in the senior sciences, are involved.

The lowest penetrations of the curriculum are reported for sub-topics 16, 18, 6 and 7. These gaps are serious ones and the more so because there is much public debate about them in many countries. Acid rain and other types of atmospheric pollution are rapidly destroying the facades of historic buildings and other heritage treasures in most industrialized cities (sub-topic 18).

The loss of arable land through shortages of water or inadequately controlled use of irrigation is very serious in many countries (sub-topic 6). Likewise the pollution of water supplies is worsening rather than improving on a world scale (sub-topic 7).

Finally, it is disturbing to find that only a few countries, even at the upper secondary level, have incorporated sub-topic 8, the scientific aspects of nuclear armaments and the risks of nuclear war - the source of what would be the greatest environmental disaster of all were a nuclear war to break out.

The findings reported here, if they do not reflect actual changes in the learning experience of students, are both encouraging and sobering. They do indicate considerable change towards greater environmental awareness in science curricula. However, on the tough criterion of 50% reporting a definite increase, it is indeed sobering to learn that not one of these sub-topics has been incorporated that widely into the curricula at any of these three levels.

For science educators committed to the environmental movement the findings are also a measure of how much still has to be achieved.

IX. F. Fleming, Lyn and Jennifer Clark. "The Time is Right to Do Something Wild." Director of Project Learning Tree, 1905 Chalcix Dr., Unit E, Lafayette, Colorado 80026, USA; Conservation Education Officer, Alberta Fish and Wildlife, Fish and Wildlife Division, Alberta Energy and Natural Resources, Main Floor, North Tower, Edmonton, Alberta T5K 2G6, Canada.

Wildlife managers have long dreamed of a well informed public, aware of the value of our wildlife heritage and the need to manage and conserve it. They have tried to inform the public about the wildlife resource through information brochures, A/V's and public presentations. However, to use this type of content-based material, many teachers had to make room in an already full curriculum. If a teacher did not have an interest in wildlife and conservation, chances were good that the material either decorated walls or gathered dust on the shelf.

Project WILD is a unique environmental education program that is designed to make students aware of wildlife and the environment while doing indoor and outdoor activities that are easily integrated into basic subjects areas: e.g. math, science, social studies, language arts, music, art and physical education. It was written and developed by educators and resource agency personnel for use by classroom teachers in kindergarten through grade twelve, as well as youth group leaders. WILD has a "bias balanced" approach to wildlife that has gained it the support of a wide variety of conservation and educational organizations.

IX. G. Harmon, Terry and Robert Schwab. "A Program of Natural Resource Management at the High School Level". University School, Hunting Valley Campus, Chagrin Falls, Ohio, USA.

Over the past fourteen years a program has been developed which applies basic science to the management of natural resources on and around a high school campus near Cleveland, Ohio. Two hundred acres of forest - and meadow-covered land provide protection to a small watershed which serves an on-campus trout hatchery. Integrated activities in aquaculture, forestry, and wildlife management provide abundant topics for study, and products such as lumber, maple syrup and trout are provided to the public, earning income which supports the program. Problems of managing resources on the campus are clearly identified with the broader, but similar problems in society at large. Evidence is provided that students' concerns for environmental problems and integrity is established and strongly reinforced by the program.

IX. H. Howard, Jeanne. "Visions of the Future: Premises and Materials." Associate Professor, Environmental and Urban Studies, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, USA.

The purpose of this presentation was to offer a selection from the variety of materials which have been prepared for classroom use in the field of future studies and to analyze some of the assumptions and premises which underlie their development.

It is the author's premise that there are three factors of over-arching importance which are critical to shaping our thoughts on what the future will be like, and that an emphasis on one or the other of these three factors tends to shape most of the well-known scenarios for the future. These three factors are: first, the importance of technological development (and the rush to high technology) as a determining factor in our thinking; second, the significance accorded to environmental considerations in the past fifteen years, and an acknowledgement of the importance of factoring environmental concerns into decision-making; and, third, the rapidly-occurring globalization of the world's peoples and concerns, with the accompanying (we hope) shifts in the perceptions of human beings toward one another. A number of scenarios have evolved which emphasize one or another of these concerns; the author believes that the best material for classroom use--or for general use--would involve a synthesis of all of these concerns.

Among the many materials which have been developed for classroom use which have a primary technological emphasis, probably the best known are those which are derived from the scenarios produced by the Hudson Institute, under the leadership of its late director Herman Kahn. Last year the group produced a program called "Visions of the Future", which has been pilot-tested in Arizona and initiated in several other states. The basic premise of "Visions" is that high-school students had been subjected, during the 1970s, to a barrage of "negative thinking" in the classroom, and that the materials which had been offered during these years had an anti-technological, anti-industrial, anti-economic-growth bias built in. "Visions" offers its materials as a corrective to what it considers these biases: in the words of the program's lead author, "The goal of the program is to restore a balanced perspective to the excessively negative (and often outdated or misleading) rendering of recent human history--e.g., the population 'explosion', the food 'shortage', resource 'depletion', the energy 'crisis.'...the school children who have been exposed to these more realistic visions of the future are redeveloping a sense of pride in America." Technology, in this scenario, will and should advance with great rapidity, leading the way toward a prosperous post-industrial society which, with luck and good management, should arrive with the minimum of social and environmental disruption.

The "excessively negative thinking" to which the Hudson materials refers came, as is well-known, primarily from the environmental movement, and especially from the landmark studies from the Club of Rome, led by the Limits of Growth scenario. Limits and other materials, while not prepared specifically for classroom use, quite appropriately were utilized in many classrooms. While the negative bias which has been attributed to these materials may have come largely from sources unfamiliar with the materials themselves (the conclusion of the original report was that it is possible to alter the trends, and the sooner we begin, the greater our possibilities for success), the image of the Club's findings was sufficiently pessimistic to justify the development of a text which would seek to correct this image. Therefore, the U.S. Association for the Club of Rome prepared a text called "Making It Happen: A Positive Guide to the Future." This text proposes to offer an environmental emphasis with optimistic conclusions: in the words of one of its contributors, Donella Meadows, a belief that "there is a wonderful world possible, one in which each person's needs are met, amply, elegantly, and sustainably...We see that world forming already, in small pockets everywhere." In this and other, more recent, environmentally-oriented materials, the focus is on shifting to styles of life which are consistent with the progress toward a sustainable world.

A number of materials are also appearing which emphasize global connectedness, with particular stress on developments in the "third world." Among the best of these are the materials prepared by the British Centre for World Development Education, located in London. This agency has prepared a number of classroom games, slides, and other visuals and also has a monthly newsletter, oriented toward classroom use. A consideration of some of these materials was included in the presentation.

As previously stated, it is proposed that the most complete course in the study of the future will include elements from all three of these emphases. Recent efforts to produce such courses, include this summer's Governor's School courses for gifted and talented pupils, in New Jersey and in Virginia, which have attempted to develop just such a total perspective. Materials from these courses was also presented.

IX. I. Iozzi, Louis A. "Science-Technology-Society. Dealing with Conflict Issues in Elementary and Secondary Schools."
Associate Professor of Science and Environmental Education, Cook College - Rutgers University, P.O. Box 231, New Brunswick, New Jersey 08903, USA.

The National Science Teachers Association (NSTA) recently adopted a major policy statement which concluded that "the goals of science education during the 1980s is to develop scientifically literate individuals who understand how science, technology and society influence one another and who are able to use this knowledge in their everyday decision-making." The NSTA recommended a minimum of 15 percent of science instruction at the middle/junior high school level and "20 percent" at the high school level be directed toward science related societal issues.

While science and environmental educators have enthusiastically endorsed this new policy position, they have also expressed concern over what appears to be a widespread lack of quality curriculum materials and/or expertise in the science education community to deal effectively with such issues in our nation's classrooms. This presentation, therefore, was designed to:

1. present "proven effective" strategies for dealing with science-techology-society issues in elementary and secondary school science, social studies, and environmental education programs, and
2. to briefly describe a U.S. Department of Education endorsed program currently available for adoption/adaption in a variety of existing programs for grades 7-12.

This presentation included activities and "hand outs" to guide participants in utilizing these strategies to develop their own materials and/or to adapt/adopt existing materials commercially available at low cost.

IX. J. Kumar, B.N. "Environmental Education as an Integrating Concept in the School Curriculum." Unity Village, East Coast, Demerara, Guyana.

SUMMARY

Environmental education serves as an integrating concept in the school curriculum generally. Three major stages can be distinguished:

1. Teaching from the environment;
2. Teaching about the environment;
3. Teaching for the environment and the emphasis in primary, secondary and tertiary levels can correspond to these stages.

A curriculum based on the environment is integrated; field studies, pollution, conservation, pesticides and wildlife are important in education.

INTRODUCTION

Education is a developing process in which change approaches, methods, curricula and teaching aids are always taking place. The constantly increasing knowledge and understanding of science and technology and the new patterns of human life which they entail make change essential in the education of children, students and adults. Today educational innovations are expressions of efforts towards more social relevance and of attempts to bring environmental education closer to real life and its needs. This pragmatic view reflects an educational policy based on a scientific approach to the world, an approach which must form part of any environmental education programme.

It is clear that environmental education offers an ideal integrating concept for education generally involving many approaches - conceptual, inquiry, relevance and process. Some general objectives of environmental education are:

1. Involves actual participation in the teaching process:
2. Aids in the training of a critical mind;
3. Helps in the practical application of theoretical knowledge;
4. Helps in education towards problem solving and decision-making;
5. Lends itself to integrated presentation.

WHAT IS ENVIRONMENTAL EDUCATION

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practical practice in decision-making and self-formulation of a code of behaviour (Policy) about issues concerning environmental quality.

The 'environmental crisis' has been bringing conservationists and educationalists together. The expression 'crisis' presents a disturbing state of the human environment, especially the natural one, as it implies a need for urgent, national, worldwide actions of conservation, improvement and wise management. Even authorities, organizations and individuals who did not care much in the not-too-distant past, are now committing themselves to the cause of environmental education. In some countries, national bodies for environmental education are set up; national legislation is made; environmental education acts are passed; environmental education centres are built up and thus MAB has an extremely vital role to play.

International organisations, both governmental and non-governmental, are also heavily involved in the stimulation and promotion of environmental education. At the Stockholm Conference in June 1972 came out -

> "The essentially interdisciplinary, humanistic ethical aspects of environmental education - the science of ecology, planetary loyalty, respect for life, care for others and lack of all rapacity - should be stressed at every level of education and mass communication, so that all people develop a primary love for their fellow human beings and for their native planet."

In December 1972, the European working conference on Environmental Conservation Education put forward:

> "Whereas environmental conservation education, under present circumstances of increased impact of man on the natural environment, has become a matter of urgent importance in all countries;
>
> and
>
> Whereas we recognize the aim of this education is to create a responsible attitude among the entire population towards the use and care of natural resources, and the protection of the environment as a whole against damage from pollution and other dangers."

This group reached the consensus that the implementation of environmental education and conservation education should include the following activities -

- appropriate education and instruction in school courses at all levels;
- education and training in environmental matters in institutes of higher education of all kinds;
- out-of-school involvement of young people and adults in practical environmental education and conservation activities;
- in-service education and training of teachers and others concerned with general and out of school education such as youth leaders;
- the training of professional people concerned with environmental affairs such as statesmen and administrators, as well as planners, architects, engineers, and technologists;
- the education of the public at large by the use of mass information media and other methods;

Environmental Education
Nursery
Primary
Secondary
Levels
(A) OBJECTIVES
Themes

Teaching from the Environment	Teaching about the Environment	Teaching for the Environment
- Basic stage in the development of programs	- Study specific topic to gain information (data)	- Teaching tries to tell how right, wrong, human interference has been
- Emphasize open-ended environmental work (no Syllabus)	- Done in and out of classroom	- Where conservation and environmental education?
- Investigate and enquiry	- Interdisciplinary feature of programme	- Problem solving
- Field studies - first hand experience, make conclusions	- Applied science experts	- Conservation is understood as "wise use and management"
- Interelation and interaction	- Recreational and aesthetic values - link programme with humanity	- Curriculum
- Learning materials	- Interrelationships in ecosystems between living things and between them and their physical environment, and there is the impact of man on the natural environment what can happen as a result of his activities.	- Evaluation

I. An Environmentally Oriented Curriculum

A. Categories of Concepts:

1. Land forms, soils and minerals
2. Atmosphere and Cosmos
3. Social organizations
4. Aesthetics, ethics, language
5. Economics
6. Area and location
7. Plants and animals
8. Water
9. People

B. Coordination between existing subjects

1. Biology incorporation
2. Connection between school education and real life in formulating a correct attitude towards the natural environment. The above view is shared by many industrial decision-makers, engineers and other specialists.
3. Environmental education cannot be taught as a discreet subject, it is more of an approach, a 'synthesizing concept.' The syllabus content is important as well as the method and approach, with the objective of establishing a learning situation concerned with principles, concepts, attitudes, values and skills rather than mere factual content.

II. Environmental Integrating Concept Implementation In Curriculum Design

1. Environmental topics - contents, objectives, cooperation
2. Identification of various topics to be related to the environment in and between different subject - correlation
3. Environmental Education in the curriculum text books, Teacher's Guide, work books.

A. Interrelating Courses

1. Integrated course - revolving around major topics involving environmental concepts - to give a variety of lecture; interrelation and interdependence of all components and about nature's severe responses to the arbitrary violation of its laws by man.
2. Major themes and biosphere approach - give a global environmental awareness.
3. Comprehensive Syllabus - 4 Sections
    (a) Processes and systems of the natural environment and the Limits of the Resources;
    (b) The ecosystem;
    (c) The interaction of man and the environment;
    (d) Environmental pressures and planning - a field study.

B. Methods, Forms and Facilities

1. Combining environmental education in the school curriculum requires innovative methods - field studies;
    - out-door activities

- regular observations

"for every school should have suitable nature study areas attached to it or within easy access, and that, in the development of new schools, specific provision for such facilities be incorporated at the planning stage"

- school garden
- national science service groups
- out of school activities

Conclusion

Other components of environmental education

- teacher training
- out of school education
- integration in other areas

The concept of environmental education, conservation of nature and natural resources should merit recognition in a permanent role as a coordinator of the curriculum in our schools. Moreover, for teachers, educators and decision makers to defer for much longer the acceptance and simplification of environmental education as a basic requirement for all pupils could be tantamount to committing suicide, because the loss of the natural environment of this world for generations to come is unlikely to be replaced by acceptable environments on the moon or on mass.

IX. K. Lefkos, Patti. "Granville Island Curriculum Resource Book and Video". Board of School Trustees of Vancouver School District, 4236 Garden Grove Drive, Burnaby, British Columbia V5G 4E6, Canada.

The Vancouver School Board produced teacher resource material for Granville Island, a unique site in Vancouver made up of restaurants, theatres, a public market, art galleries, a maritime market and various industries. This session presented an overview of the Curriculum Resource Book -- a good model for any urban studies unit. Suggestions for pre-trip, on-site, and post-trip activities were stressed as well as various evaluation techniques and formats. Several timeline activities and gameboard instructions were included. The Granville Island Video was shown.

IX. L. Lipka, Jerry. "Environmental Education Alaskan Style: The Bristol Bay Curriculum Project". Assistant Professor, University of Alaska, Box 10206, Dillingham, Alaska 99576, USA.

Native peoples of rural Alaska today are caught in a complex and interesting intermingling of life-styles. Traditional values, customs, and a subsistence economy combine with modern conveniences, technology and membership in multi-million dollar Native Corporations to make up the fabric of life. Life in rural Alaska takes place in villages which are widely separated due to vast distances, natural physical boundaries, and the lack of a road system. Alaska, unlike the lower 48 and third world countries, is not yet at the point where problems of pollution, depletion, and population are the critical environmental concerns, although, of course, specific instances of each of these can be found. Instead Native people in rural Alaska found environmental problems in terms of possible impacts on their subsistence and commercial use of local fish and game resources. The land remains fundamental to life in the north; it provides physical and spiritual sustenance. The people are directly tied to the land for their cultural survival.

The rural Alaska scene is today rapidly changing, as it has since contact with Europeans. Technological and cultural innovations are commonplace, for example adopting the snowmobile for hunting purposes. The passage of the landmark federal legislation called the Alaska Native Claims Settlement Act (ANCSA) in 1971 quickened and altered the pace of change. This law partially extinguishes aboriginal rights by arranging for a land and cash settlement of 40 million acres and $962.5 million. ANCSA also established Regional Native Corporations, thirteen in all, to manage the land and cash. This creation of profit making Native Corporations has substantially altered the age-old ways of surviving off the land to include, at least presently, corporate profit.

There are currently strong pressures for development, both external and internal, as a response to the profit potential of Alaska's vast natural resources. For instance, ANCSA mandates the Native Corporation to make profits; developing natural resources is one means of accomplishing this. However, these developments invariably put increased pressure on the vast environment and fragile ecosystems which are necessary to the continuance of a subsistence way of life. These often conflicting factors - development, environment, and culture - are all part of the unique set of circumstances which shape rural Alaska.

It is within this total environment that many challenges are presented to environmental education, primarily the need to adapt to a context in which the environment is of fundamental concern to the people for reasons of cultural survival. International environmental educators for some time have been calling for an intermixing of economic development and environmental concerns in environmental education. In rural Alaska concerns about subsistence, Native sovereignty, and Native Corporations must also be considered. Otherwise, imported views of environmental education or limited environmental perspectives and solutions may neglect and offend local people. This paper describes one curriculum development project which integrates issues of development, environment, and culture by using vital regional problems as a learning opportunity and course content. The following case information on a curriculum project in the Bristol

Bay region of Alaska should prove applicable to others in developing countries or cross-cultural contexts. More generally, this example should be useful to those involved in developing issue-oriented environmental education programs.

The Bristol Bay Curriculum Project is an on-going high school curriculum development project sponsored by the University of Alaska in cooperation with three school districts and ten Native communities. Bristol Bay is located 350 miles southwest of Anchorage; it is comprised of 26 villages, the majority of which are populated by Alaska Natives; Yupik Eskimo, Aleut, and Athabascan. It's 5,000 inhabitants are scattered over an area the size of the state of Ohio. The majority are involved in a mixed cash and subsistence economy. This vast wilderness area supports the largest red salmon fishery in the world, and other rich natural resources including caribou, moose, walrus, oil and gas, and minerals.

Developing an appropriate curriculum for high school students in Bristol Bay called for an open approach that would allow for the gathering of information from diverse interests: developers, Native Corporations, environmentalists, state and federal agencies, and village communities. A three phased approach to curriculum development was designed. As the intent of this approach was to formulate curriculum that responded to felt needs of the region, it had to maintain flexibility to change, reflecting both political changes in the region and the curriculum developers' increasingly deeper understanding of local concerns. Simultaneously the project itself began to create changes in those publicly debated issues through student involvement in on-going regional debate.

The first phase, utilizing an ethnographic approach, was particularly important since it transformed the curriculum. Initially the project was conceived as emphasizing environmental concerns raised by various developmental plans, and their potential impacts on subsistence. The project's original goal was to inform and involve youth in the public debate on these plans. But our ethnographic data collected from more than ten villages disclosed that ANCSA-related issues needed to be addressed as well. After approximately one year of data collection from community groups, and state and federal agencies, a more holistic curriculum was designed which addressed issues of ANCSA, land and development.

The second phase, curriculum design and implementation, placed important emphasis on the matching of in-classroom activities to regional events. Students had the opportunity to participate in a series of regional and state-wide meetings concerned with ANCSA, development, and environment. One such event, a region-wide youth conference, was a response to requests from students and committees. Students, teachers, Native Association and Corporation members, and diverse developmental and environmental interests participated in the conference. The students not only learned about the issues but they also shaped, however slightly, the public debate. The curriculum, by being tied to on-going regional conferences and meetings became part of a larger political process. In addition, the curriculum is slowly adapting to regional differences in attitudes, language, school size, and local problems and concerns by designing flexibility into the curriculum content and process for each village school.

The third phase, formative evaluation, has begun to direct us to more fundamental questions underlying the dynamic interplay between Native Corporations, the environment, and development. Issues of politics (Native sovereignty), identity, and economics are of deep concern to students and community members. Data provided by students at the youth conference suggested the importance of involving students in many phases of the project, making them feel that they have "ownership" in the curriculum, and connecting them to potential leaders. The curriculum continues adapting by including grassroots community concerns and by being open to feedback from students, teachers, and diverse developmental and Native interests. The project's vitality comes from its timeliness, its process of responding to deeply felt regional issues and its cooperative spirit.

In summary, the Bristol Bay Curriculum Project has transformed itself from an environmental curriculum to a more holistic curriculum fitted to and contributing to the Bristol Bay region. By utilizing an ethnographic approach to data collection and an open approach to curriculum development, environmental education Alaskan style includes development, environment, and culture. The curriculum process of involving students in publicly debated regional issues matched with in-classroom curriculum contributes to a dynamic interplay between school and community which is so important in small homogenous communities. What is learned in the classroom is applicable to the larger community and visa-versa. Youth are learning skills necessary to them as potential leaders in the region and the corporation. Developmental issues and their environmental impacts are of greater concern to youth and adults when they are viewed in a local frame of reference. Environmental education Alaskan style is still evolving, as we learn more about the interrelationship of these issues in the context of a changing environment.

IX. M. Lubbers, James D. "Environmental Education is Conspicuously Missing". Assistant Professor of Science Education, SUNY College at Fredonia, Fredonia, New York, 14063, USA.

The recent report from the National Science Foundation, Educating Americans for the 21st Century, is a plan of action for "...improving mathematics, science and technology education for all American elementary and secondary students so that their achievement is the best in the world by 1995." Conspicuously missing from this report is any mention of environmental education except as it can be related to biology or technology education. Fitting environmental education (EE) into the curriculum has been a continual and difficult problem, but in this report it is particularly relevant to issues presented in technology education.

Also, several national organizations are documented in the report, but NAAEE is not among them. NAAEE has a responsibility, not only to support the objectives of the NSF report, but also to make known its own objectives for the future. This approach could also provide a framework for the future concerns of the Association.

The report is largely a response to a recognized need for improvement in skills and knowledge related to the increasingly technical nature of society. Computers, of course, are the major influence, having been compared to the written word and books as a revolutionary agent of change in communications and education. There is no question about the need, particularly in math and science education, for people to adapt to this trend. The third component emphasized in this report (NSF, 1983), examines the need for technology education to provide the fundamental understandings concerned with "technological innovation, the productivity of technology, the impacts of the products of technology on the quality of life, and the need for critical evaluation of societal matters involving the consequences of technology."

In addition to the NSF report, many other organizations have offered similar statements of the need for technological literacy (AATE, 1983; ASCD, 83/84; ASE, 1981; ATE, 83/84; BSCS, 1984; NSTA, 1982). This is clearly a trend that will mushroom through the next few years, and the implications for EE are quite obvious. A major goal of EE is to increase the knowledge and awareness of the impacts that humans--through technology--have on the environment, and to translate this sensitivity into a rational decision making process which minimizes such impacts. Throughout the relatively brief history of environmental education, it has often been confused with outdoor education, conservation education, and/or nature study. It has become part of biology education, has evolved into environmental science courses, and has been incorporated into many disciplines, most notably in science and social studies. It is pervasive, difficult to pigeonhole, and it relates to virtually every aspect of education, but it will never disappear. Since it is often under the guise of some other concern, people do not usually realize the fundamental ecological or environmental issues involved until after the fact or unless the concern affects "birds and bunnies' or themselves directly. Technology education may provide the most logical connection yet for EE because at least some of the goals are in common and some of the most fundamental issues are the same. For example, in Science in Society (ASE, 1981), one of several new programs in Science/Technology/Society (STS), the aims of the project are a combination of both scientific and environmental concerns:

1. To understand the nature and limitations of scientific knowledge.
2. To appreciate that the use of scientific knowledge can be both beneficial and detrimental to society and the environment.
3. To appreciate that the Earth's resources are finite.

4. To understand the need for, and to develop the ability to make reasoned decisions which take account of all relevant constraints; and to recognize that moral considerations are involved in making decisions.

It is easy to see the overlap with EE in objectives such as these. Similar objectives were offered by Lubbers (1981b), and in many of the recent statements issued by national teachers and science organizations, the concern for negative impacts of technology is an integral part of technology education.

The trend toward technological literacy can be interpreted two different ways. A somewhat limited view is more precisely termed "computer literacy" where the emphasis is on being able to function in a high tech society. From "ecology," a more encompassing view of technological literacy involves the ability to not only be able to function in such a society, but also to cope with the on-going change and to understand the development and structure of our not-so-natural technological system. It is this second and more broadly interpreted conception of technological literacy that is important as a general understanding by the public and as a vehicle for increased environmental awareness. Also, it should be noted that technical expertise and literacy, with computers or machines in general, is desirable as well but it may not be within the grasp of everyone and it may not provide the balance of perspectives essential to understanding the role of technology in society.

It can also be argued that technological literacy is a product or synthesis of both scientific and environmental literacy (Lubbers, 1981a). The role of technology in society obviously includes both positive and negative impacts. In a traditional sense, the scientific community (and by implication science education) has promoted and supported technology, i.e., the "applications of science," whereas the major outcome of the environmental movement (and environmental education) has been to question the negative impacts of such applications for their actions. Technology education is a more objective approach because both the benefits and cost/risks are examined. EE has incorporated this approach to some extent but technology education has an inherently more neutral stance, and like EE in the 70s, is now being recognized by the general public.

Top-down problems may best be solved by bottom-up or "grass-roots" types of approaches. The public is asking for the ability to understand and cope with the rate of change in today's society. EE should not only be given some credit for the trend toward technology education, but should also capitalize on the opportunities for helping people understand the "nature" of our technological society.

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IX. N. Mickelson, Belle Heffner; Janet Ady and Peggy Cowan. "Alaskan Environmental Education Strategies." Asst. Professor, University of Alaska, Box 325, Cordova, Alaska 99574, USA.; Visual Information/Environmental Education Specialist. U.S. Fish & Wildlife Service, Anchorage Regional Office, 1011 East Tudor, Anchorage, Alaska 99503, USA.

Alaskan environmental education efforts must overcome great distances, teacher transcience, teacher unfamiliarity with Alaskan ecology and peoples, teacher hesitancy toward using community and field experiences and lack of knowledge of outdoor survival skills. Slides presented a variety of Alaskan environmental education approaches. Participants discussed new options for environmental education in Alaska. A variety of "hands-on" activities and handouts were available including wildlife games, seaweed and sand samples, wetlands activities, walrus puppets, community inventories, sea shanties and Alaskan seafood.

IX. O. Phillips, Hugh C. "Energize Your Curriculum: 1 to 6." Program Director, Society, Environment and Energy Development Studies Foundation, #440 10169-104 Street, Edmonton, Alberta, Canada T5J 1A5.

This participatory, hands-on workshop illustrated the use and implementation of energy/environmental materials in your elementary classroom. The S.E.E.D.S. (Society, Environment and Energy Development Studies) 1 to 6 Energy Literacy Series was featured. Complimentary SEEDS posters with teacher's guide, SEEDS provincial field trip guides, the SEEDS energy/environment bibliography and SEEDS newsletter was available.

IX. P. Phillips, Hugh C. "Energize Your Curriculum: 7 to 12." Program Director, Society, Environment and Energy Development Studies Foundation, #440 10169-104 Street, Edmonton, Alberta, Canada T5J 1A5.

This participatory, hands-on workshop illustrated the use and implementation of energy/environmental materials in your elementary classroom. The S.E.E.D.S. (Society, Environment and Energy Development Studies) 7 to 12 Energy Literacy Series was featured. Complimentary SEEDS posters with teacher's guide, SEEDS provincial field trip guides, the SEEDS energy/environment bibliography and SEEDS newsletter was available.

IX. Q. Phillips, Hugh C. "Hughisms for Interpreting our Natural World." Program Director, Society, Environment and Energy Development Studies Foundation, #440 10169-104 Street, Edmonton, Alberta, Canada T5J 1A5.

This participatory session outlined techniques, teaching ideas and resources in the interpretation of our environment. The session included practical and timely "Hughisms" in developing your competence and confidence.

IX. R. Richards, Don. "Environmental Education in Practice: Across a School Curriculum". Principal, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

INTRODUCTION

Education's function should be to educate all sectors of mankind to understand the total environment so that not only does mankind benefit from it, but that the total environment remains a stable productive factor. In fact, a symbiotic inter-relationship which is mutualistic.

What we are looking at here is the survival of both man and his environment. Man depends entirely on his environment. The environment can do without man but can also be totally destroyed by man.

Two responses seem to suggest the mounting interest in Environmental Education. These are:

The current concern with the problem of cities - the built environment that is becoming increasingly inadequate as a concept for living. Population density, inner-city decay, pollution, alienation, and moral decline are some of the environmental and psychological stresses to which urban man is subjected.

We cannot divorce our man-made environment from the natural environment, nor man from his natural world. Thus our second awareness concerns the natural world. Man is effectively polluting and depleting the natural resources of his world, the environment he cannot be separated from. Man is causing a vanishing wildlife and a threat of ecological disaster. If man is to live in harmony with the natural order of things, and inspire his deeper self, he needs to find a better balance between the integrity of his environment and its destructive exploitation. Indeed there is a concern sweeping the world today which recognises that mankind can no longer have a free ride at the expense of the earth's resources.

If we are to interpret the creation of this world from Genesis we can see that God provides a garden - an ordered and planned arrangement of living things - for man's needs and enjoyment.

In this garden, man was set not to indulge himself, but to till it and care for it. Calvin's comments on this are most appropriate 'the earth was given to man, with this condition, that he should occupy himself in its cultivation ......' The custody of the garden was given to Adam, to show that we possess the things which God has committed to our hands, on the condition, that being content with frugal and moderate use, we should take care of what shall remain. Let everyone regard himself as the steward of God ..... We all know what happened to Adam and man has been on a steady decline since. God demands that wise stewardship of us and we either obey or disobey God.

Town and urban study programs, environmental and conservation awareness programmes and a multitude of symposia on world environmental problems and on environmental education testify to the urgency with which we seek a more empirical analysis of the relationship between the behaviour of man and his complete environment.

The writer believes that children must be introduced into the concept of the environment, must be exposed to the environment as soon as possible.

Paiget, the noted child psychologist and researcher, maintains that from about the age of eleven years on, children begin to be able to evaluate the world around them without relying on information gathered from concrete objects. According to Piaget, they are now ready to begin learning abstractly. Children at this stage gradually develop the capacity to reason through the use of hypotheses. When given information, they can start making logical deductions without first turning to concrete examples.

Hence it is reasonable to presume that children at the age of eleven upwards would be the suitable age to introduce to "environment" and its role for the survival of mankind.

A BLUEPRINT - THE TREVERTON PROGRAMME

Treverton Prepartory School in Mooi River, Natal, embarked on an exciting educational venture by introducing environmental studies across the whole curriculum at the Standard five (grade 7) level in 1979. This method involves tuition and practical work in all the normal school subjects, including science, geography, history, mathematics, English, Afrikaans, art and religious instruction in the outdoors and then later in the classroom where the pupils consolidate what they have learnt.

The central theme of the study is the Mooi River from its source in the Drakensberg Mountains to its confluence with the Tugela River and then down to the sea. The many varying ecological habitats and systems provide ideal subjects for study and comparison by the boys and girls in the Standard five classes. The study area also embraces three major wilderness areas in Natal and Zululand.

The study area also contains two differing urban environments, the seaport city of Durban and the small town of Mooi River. Both of these are used across the curriculum in urban studies.

The class spends an average of five days away in the field at each study area, using the environment there, rural or urban, to cover all subjects normally taught in the classroom. As environmental studies is an inter-subject discipline, suffice to say that when a class goes out into the field to study the basic history of the area, the students will at the same time be exposed to science, geography, mathematics, the languages, art and physical training there.

Once in the study area, the class is usually divided into groups. Each group concentrates on a specific research of the study although they will be exposed to the whole. On return to school, the class completes a two week consolidation period which is interwoven into normal school subjects. During this time, the pupils prepare projects and group teach-backs on the results of their research.

This environmental approach to education is a scholastic one which enables boys and girls to study and learn through real-life situations, backed up by normal teaching practices. As they get to grips with the environment whether wilderness or urban, they discover their place in it and their responsibility to it.

Ten study areas are researched each year. These are:-

1. The school and its environment
2. The Giants Castle Game Reserve - a study of the Drakensberg Bushman.

3. Mooi River town - an urban survey
4. The Kamberg area - study of the sources of the Mooi river and its surrounds.
5. Zululand - a study of the culture and history of the Zulu people plus bushveld ecology and estuarine ecology.
6. Rosetta - a study of the upper middle Mooi river and its environs. Here a comparative study is made between the river and a dam.
7. A study of Durban - early history of Natal, the early settlers, settlement geography, a study of the coast and the sea, including fish and the docks of Durban.
8. A study of Pietermaritzburg, capital of Natal.
9. A study of the Mooi River falls.
10. A farm study.

Comparison of all study areas is made and conclusions are drawn up.

Although each study area is covered inter-curricularly, for the purpose of this presentation, six study areas will be covered by the pupils sharing the platform today and each study area will be approached from a specific discipline. From these report backs by the student you will be able to glean some idea of what the children have learned during the year and the extend of their involvement.

Each student has written their own paper and produced their own overhead transparancies to be able to give you some idea of the academic depth of the programs and to give you a sample of one of the procedures used in the classroom, namely the teach back.

CONCLUSION

During this year of total involvement in the environment, the children emerge as young people whose attitudes and values have changed. They have not only received a true education, but have become caring people, caring for others, for their environment and for the wilderness they have grown to love.

We have to look to the future and we believe that this form of education immerses the student mentally, physically and spiritually, building up his confidence to meet demands and to solve problems. The students gain a deeper understanding of man's dependence on his environment and his environment to it as the custodian of God's creation. Our young people hold our planet earth in their hands.

IX. R.1 Jonsson, Caroline. "How We Cover Mathematics". Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

INTRODUCTION

I will now tell you how we cover the mathematics syllabus in the Standard 5 environmental year. Whatever we are taught in the field is then applied to classroom work. For example, having completed the study of an area in the field by measuring playing fields and swimming pools, consolidation is carried out in the classroom, using the necessary text books. Furthermore we can understand the different math problems as we are faced with them in real life situations. Nevertheless the entire math syllabus is also covered in the classroom.

For this talk I am concentrating on only one of our study areas, and that is of the school. The class is divided into five groups, each group is given a certain task.

GROUP ONE is given the task of measuring all the buildings in the school grounds, they also have to note the building materials used and the colours of the buildings. In the meantime, GROUP TWO measures all the playing fields including the swimming pool. They also measure the width and length of roads in the complex and the distance between the buildings. From this information, the two groups get together and draw a scale plan of the school and its grounds.

Using a theodolite, GROUP THREE have worked out gradients and contours and are thus able to furnish further information for groups 1 and 2.

GROUP FOUR's task is to make a count of all the trees, estimate their heights and to plot the trees on a sketch map of the school grounds.

GROUP FIVE has the task of setting up four bird-viewing stations in the school grounds, making bird counts and plotting their movements.

From all the information produced by the five groups, the class constructs a scale model of the school and its grounds during art periods.

Each group had further mathematical tasks to perform in this study.

GROUP ONE had to interview the school caterers and from this information construct bar graphs of the different foods used in the school on a daily and monthly basis.

GROUP TWO had to find out how the swimming filter operates, to draw the system and to work out amounts of chlorine and acid used during the study period.

GROUP THREE had the additional task of maintaining a weather station and from the recorded data to produce graphs of maximum and minimum temperatures, rainfall and atmospheric pressures during the study period. The group also plotted litter found at the school, made counts of the different types of litter and from the recorded data, drew pie graphs. A litter-tree was then placed at the entrance of the school hall with a message to remind the scholars of their responsibility to the environment.

GROUP FOUR's main task during the survey was to obtain soil samples from four different stations in the school grounds. Once having obtained the readings of nitrogen, phospherous and potash, graphs using a soil test kit were produced from the relevant information. The group also interviewed the school bursar, finding out the school maintenance costs and produced graphs from these figures.

Further graph work involved the percentages of the different tree types found in the school grounds.

GROUP FIVE had the task of counting the number of different birds of each species at each of the four stations. Three counts were made each day at the same time during the week. After totalling, bar and pie graphs were produced of daily counts and also total counts.

We also make use of our environmental centre at the school, which actually houses our standard five classrooms. The centre has three acres of land through which two self-guided trails run. These are an ecology trail and an esti-metre trail. The centre also contains a soil-pit, a pond ecosystem, a weather station and a walk-in bird aviary which also contains a reptile pit. A great deal of our practical mathematics takes place in this Environmental Centre.

CONCLUSION

We are involved with mathematics data and problem solving throughout the year in various study areas and I am sure that you can see how much more meaningful mathematics can be by using the environment. We certainly think so.

IX. R.2 Champkins, Alan. "An Urban Survey: A Geographical Study of our Town - Mooi River." Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

Many geographers claim that geography is environmental education. Be as it may, settlement geography is an extremely valid component of environmental education. Our next speaker, Alan Champkins, will talk on our 'Urban Survey' - a survey of the small town of Mooi River.

Mooi River is situated in the midlands of Natal. Practically the whole of this area is approximately 1500 metres above sea level. The average rainfall varies from 35 mm in the west to 26 mm in the east per annum. The climate is cool and bracing in summer and cold in the winter months. The area around Mooi River is mainly sour veld which means that the indigenous redgrass (Themeda tricandra) loses its feeding value in the cold winter months. The country is very mountainous to the west and undulating to the east.

As part of our standard five year, we had as a class, to make a geographical study of Mooi River town, where Treverton is situated. To accomplish this the class was divided into five groups each concentrating on a certain aspect. Theses five aspects were:-

1. A study of communications
2. A survey of food imported to and exported from Mooi River
3. A survey of the people of the town
4. A study of land use
5. An investigation of pollution and a health survey.

I was involved with the group which made a study of communications. To accomplish this, we studied the railway system, the post office complex, which involved post, telephone and telegraph, all the garages and lastly a vehicle census.

Two of our groups posted themselves at the railway station for three mornings to note the number and destination of the trains. Information was also gathered from the station master and it was thus possible to work out what goods were being carried and to where. From this information, our group was able to create flow-line maps once back at school.

Whilst this was going on ,the two other members of the group and I were making a study of the Post Office in Mooi River. We made a survey of how many letters go out and come in on an average day. Where to and where from. We also noted the range of stamps used in the post office and in which proportion they were sold in an average day.

An hour of each day during the first week was spent by two of our group making a vehicle census of the vehicles entering and leaving Mooi River at a certain point. We noted whether they were heavy or light vehicles or other, for example, tractors. We also noted their registration numbers. From this information we were able to make graphs representing the different vehicles.

The survey of the garages entailed finding out the number of vehicles visiting them, their purpose - whether for petrol (gasoline) or repair, the amount of petrol sold on an average day and what sort of repairs were being done. These calculations made the inter-relationships of maths and geography very meaningful for us.

During our second week of the survey our group had the privilege of actually working in the post office, taking turns in manning the counter, the manual telephone exchange, and the telegraph office. We also sorted the mail and interviewed the Post Master. On returning to school we had to write up our findings and experiences which resulted in a greater understanding of our communication system.

Whilst completing this survey, the other groups were not idle either, Group two traced the origin of all food imported into Mooi River and who the manufacturers were. From this information, flow line maps and graphs were produced during consolidation back at school. This group worked in the local supermarket in their second week, stocktaking, loading shelves, pricing goods, manning tills and working in the butcher shop.

Group three completed the most unenviable task of all - that of completing a people survey. Asking people how old they were, where and when they were born, attracted some strange reactions, but brought out some interesting figures when compiling graphs and flow line maps. The information was supported by checking past records from the municipal offices and churches. Apart from population counts, marriages, births and deaths were recorded from the beginning of Mooi River up to the present day. Graphs were also compiled from information gathered on occupations, ages, popular names and schools.

Group four had the task of studying the land use in the town and future town planning. They had to record the buildings in Mooi River and their functions. They also had to show on a map of the town where all the shops, industries, residential areas, etc. were situated. They also had to discuss future town planning with the Town Clerk. To this end they were assisted when the whole class sat as a town council in the actual municipal chambers for one morning and debated a problem that was thrown to us by the actual Town Clerk of Mooi River.

Group four spent their second week working in a factory, namely the cheese factory, actually making cheese and going through the whole process from milk to packed cheese.

During group five's pollution and health survey, they had to plot and photograph sites of pollution and mismanagement in the town. They also noted the state of drains, streets, gardens, shopping and industrial areas and the river, namely the Mooi River, which runs through the town. This group also recorded noise and air pollution and collected samples of water pollution. They calculated the proportion of plastic, metal, paper, glass, etc. in each polluted areas and presented interesting graphs. Group five worked with the Town Engineer during the second week, at the sewerage and water works - collecting samples, analysing them and learning how these important aspects of a town worked.

CONCLUSION

This geographical study of our town Mooi River was not only interesting, but taught us how a town functions and hopefully, those of us who have had the privilege of learning through the environmental manner will be aware and educated regarding our urban environment and will be conscious of the need for wise urban planning. We were not at all happy with what we saw in our town and hope that our results, delivered to the town council, will produce action.

IX. R.3 Blaine, Sally. "A Study of the Drakensberg, with Special Reference to the Bushmen." Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

(The ability to communicate is probably the most important asset that any human being is blessed with. From primitive tribal days to our modern technological society, communication between man and man, country and country in the written or verbal form can extend man's endeavours and strivings to higher peaks. Using the English language and music as her medium, Sally Blaine will speak on 'A Study of the Drakensberg with special reference to the Bushmen.)

Kaa the Bushman sat at the entrance of his sandstone cave, shaping the rounded stone which he was making for his digging stick. Tomorrow Kos, his wife, would use it to dig up the ant nest they had found down in the valley. Behind him the mountains were a bright splendour of shimmering blue, topped with the massive face of Ngonomateng, which in time to come the white man would call Cathkin Peak. Below him the sunlight slept in the green valley and in the sky above, the great cloud caravans moved silently over an azure plain. Behind him, Kos his wife was preparing the bulbs and the roots they had gathered that morning for the stewpot, while in the far corner Soneib was busy painting an oribi on the wall of the cave.

My task today is to talk to you on how we utilize the environment to study the English language. One can imagine what effect the surroundings have on pupils through personal experiences. I know what the effect is whilst sitting doing solitaire, we can imagine the bushman living in harmony with the hills, mountains, summits and streams of the Drakensberg range, the highest mountains in Southern Africa.

Don Richards wrote:

> "on sunlit coves, and around fires in caves, little brown men lived, hunting to eat, and enjoying the simple pleasures of life; and they too were content."

The bushmen average at approximately 135cm tall. The woman have large buttocks and stomachs while the men are taller and slimmer. Other characteristics of the bushmen are their high cheek bones and flat noses. They are believed to have migrated from Mongolia because paintings similar to the ones in the Drakensberg have been found around the Mediteranean sea. The bushmen language is a click language which is similar to the Hottentot language. The Hottentots were an early race of Southern Africa.

We are able to study the English language on trips in the way that we have to give adjectives, adverbs and verbs describing our surroundings and emotions. I will now ask you to take an imaginary journey into the past when the bushmen still inhabited the Drakensberg range.

Kaa was one of the many inhabitants of this beautiful area which night was wrapping her cloak around. Kos, who had prepared the bulbs for the stew, saw Kaang returning with the group of young and more experienced hunters. They had obviously been tracking eland because they returned with a large eland ram. Son-eib saw them returning and decided, to please their God, Kaggen, he would paint a picture of it on the cave wall.

That evening they had a feast consisting of the day's hunt and collection of roots and berries. The young child of 18 months was wrapped in a caross and put on an eland hide to prevent the cold attacking it. Once the child was asleep they danced around the fire to celebrate the successful hunt. After a rousing dance the old man of the tribe, Son-eib, started telling stories about a great hunt when he had been younger. This was his first attempt at hunting and a successful one. He had hunted a giraffe and killed it. This had been possible with assistance from more experienced hunters. Kaang was following close in his footsteps.

Let us take another journey back into the present day Drakensberg. Where have the original inhabitants gone? Why are they no longer in existence?

EXTINCTION has struck them. When the white and black men intruded into the Drakensberg they took over the grazing lands of the eland. They also hunted out the eland. The bushmen were slowly starving so they went and hunted the cattle of these intruders. The intruders thought this unjust and hunting parties were sent out to hunt them. THE DRAKENSBERG HAS LOST THESE WONDERFUL PEOPLE AND APART FROM THEIR PAINTINGS THEY SHALL NEVER BE FOUND AGAIN. It seems unjust that such a harmonius people should end so tragically. Their extinction is our loss.

IX. R.4 Hurry, Nicola. "Science Section - The Mooi River". Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

(The Mooi River, as mentioned, is the central theme of our year's study. Nicola Hurry will now present 'A scientific study of the river'. As you listen, you will be aware that science, mathematics and geography have no barriers here.)

INTRODUCTION

The Mooi river (the beautiful river) rises in the Highmoor area close to the Giants Castle peak, in the Natal Drakensberg. It meanders slowly down through the foothills of the Drakensberg, passing through the town of Mooi River, the home of our school.

Approximately 12 km upstream from Mooi River town the Mooi river is joined by the Little Mooi. This is good farming country with crops such as hay, potatoes and maize being grown. There is also horse studs and dairy farms.

THE IMPORTANCE OF THE DRAKENSBERG CATCHMENT AREA

The Mooi river is part of the Drakensberg catchment area. Water from this area is used by towns and farms in many parts of Natal. Cities such as Durban and Pietermaritzburg use water which comes from the Drakensberg, and many irrigation schemes rely on Drakensberg rivers for their water supplies.

THE MOOI RIVER WATER CYCLE

The eastern escarpment of the Natal Drakensberg is one of the highest rainfall areas in South Africa. Some parts of these mountains receive 1, 500 mm of rain. Of this snow and mist contribute about 500 mm per year.

Because of the warm Mozambique current that washes the shores of Natal, the eastern seaboard and interior experiences high relief rainfall. Warm winds sweep inland from the east, carrying evaporated moisture from the Indian ocean. They are forced upward by the land, they cool, clouds form and rain or snow results.

The movement of moisture from the Indian ocean towards the mountains and then back again to the Indian ocean is a perfect example of a water cycle.

OUR SCIENTIFIC STUDY OF THE MOOI RIVER

In order to get a good idea of the Mooi River basin, we studied a number of different aspects. I will mention some of them to give examples of the work we did:

1. One of the things we studied was the wild temperate forest that grows on the cool, moist slopes of the Drakensberg. It is important to conserve forests in order to conserve water supplies. Not everybody realises this. In places farmers have cleared the vegetation and planted crops right to the river bank. As the crops can't hold the soil as well as the natural vegetation many of the banks have collapsed and parts of the river have silted up. (I might say that this happens despite laws which state that it is illegal to plant crops within 30 metres of the river banks).
2. At different places along the Mooi River our class studied different aspects of the Mooi river itself. One of the first things we did was to use simple measurements and observations to measure the width of the river at different places.
3. Another measurement that we did was to measure the depth of the river at different places. To do this we waded into the river measuring the depth at one metre intervals along a straight line with a metre rule for a distance of 10 metres. We did this at three different points. To draw the bank of the river we continued with our transect up the bank for 10 metres by stretching a line from the highest point parallel to the original line from the water.
   The results were discussed during consolidation in the classroom. We used our information to draw cross sections of the river at the three places.
4. An example of another measurement was that of speed flow. We measured the speed of the river at different places by dropping a stick into the water and timing it over a 10 metre distance. We found that the fastest flow was near the

shallow part of the river, while the river flowed slowly where it was deep.

5. We caught small river animals and studied them in glass jars before letting them go again. We studied different parts of the Mooi river and learned that the cleaner parts had more animals than the more polluted parts.

   By studying different parts of the Mooi river we learned that certain animals do better in polluted water than others. Through this we learned which animals show polluted water and which animals show clean water. We called these animals INDICATOR SPECIES.

CONCLUSIONS

The health of the river depends upon two things:

- Firstly, the river catchment must be in good condition so that the river does not silt up or the river banks collapse.
- Secondly, the river should not be polluted by chemicals, fertilizers and sewage. These will affect the plant and animal life.

Water is one of the most precious possessions. By looking after our rivers we can ensure that we always have a clean, reliable water supply.

IX R.5 Laundy, Patrick. "The Zulu People and Their Inter-relationship with the Natural Environment." Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

(Conservation is an integral part of Environmental Education. A week during the year is spent by the class in Zululand to study the Bushveld eco-system and the inter-relationships of the Zulu people with their environment. Patrick Lundy will cover this aspect.)

As part of the Standard Five year is spent in Zululand to learn about the history and culture of the Zulu people, we were also able to camp in the natural environment where the Zulus lived.

By studying the rhythms and cycles of the natural world there in the bushveld, we were able to realise how the Zulu lived in harmony with his environment and how he understood it.

The Zulus were a pastoral people and it was in their interests to know how the environment could be used to help them to survive and therefore it was important to them that the environment was conserved.

We were able to learn that practically every bit of vegetation was of some use to the Zulu, and we found it to be most interesting learning how the Zulu way of life was inter-related to most aspects of his environment.

First of all, we learnt that the Acacia tree is very important in the bushveld. Apart from being a good browsing feed for his cattle, the gum expelled by this tree was used by the Zulus to cure dysentry and the thorns were used for needles. We learnt that the Acacia is a legume and therefore a very important part of the nitrogen cycle and encourages shade grass for winter grazing. Furthermore, it was a wonderful experience to sit under an Acacia tree in the wilds and to see how it had adapted to that environment.

As the Acacia tree grows in low rainfall and high temperature areas, it has a small leaf surface, therefore little transpiration takes place. The tree is umbrella-shaped exposing a wide area of leaves in the process of photosynthesis. This umbrella shape also keeps the leaves away from the fire which is common occurence in the acacia savannah.

The Acacia is a source of food for many of the browsers of the area. The animals browse on different levels. This prevents animals concentrating on one area. Thus there is more food available enabling the vegetation to support the maximum number of animals.

Because of the shade cast by the Acacia tree, the ground also is rich in shade grass which the animals leave for their winter grazing. The animals stay in the shade of the Acacia tree at midday, chewing their cud, they then drop their dung there. The seeds of the grasses in the droppings germinate so there are more edible grasses. This causes further grazers and their predators. Food webs soon form around the tree.

In the acacia savanna we find the harvester termite or white ant. The name white ant is actually wrong because the termite is not an ant, but a member of the cockroach family. The termite is in fact preyed upon by the black ant.

In our study we found that termites build mounds that extend about one-tenth above the surface and the rest below the ground.

Termites use grass as a source of food. They take grass way down into their termitaries. They can cause terrible devastation of an area unless checked.

Termitaries become the centre of food webs. The termites bring deep seated mineral salts to the surface, fertilizing the ground and thus causing rich grass growth, which in turn attracts grazers and therefore predators.

So it has become obvious to us that termites are useful as well as harmful and that natural controls are necessary to keep a balance. This is something the early Zulus recognized, but unfortunately this natural law has been lost to many of our modern day people, who have exterminated the controls, resulting in starvation of their cattle and eventually themselves.

CONCLUSION

Our time spent in Zululand is rewarding for the class and the individual. By carrying out our studies as we do, we not only learn about man, animals and plants, we feel them, see them and absorb the atmosphere of the place. We also learn to live with and understand each other. We become better pupils and, surely more important, we become better people. I have found that I no longer take the things of nature for granted, and that I must be responsible to look after the world that God has created.

It seems to me that the world is going mad to prove something. If only we could be like the early Zulus, but maybe then, with better understanding we can.

IX. R.6 Parvess, Barry. "Zulu Culture and History." Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

(History for many years has been taught in such a 'dead' way that many a young student has been completely 'switched off'. History is about to change, and taught in the environment of its happenings, can inspire even young students to enthuse. Barry Parvess will, from his experience whilst with the class in Zululand, speak on the 'History and Culture of the Zulu people'.)

Africa accounts for a quarter of the land surface of the earth and 10% of its population. Almost half of this immense continent is arid or terribly humid; desert or equatorial forest, both of which are hostile to man. Of the total land availability, only 3% of it can be classified as truly fertile, and a further 8% as moderately so.

Like other continents in the world, Africa's resources will not last forever, and the fact that strikes a note of urgency is that Africa has one of the fastest growing populations of the world. By the turn of the century her present numbers would be doubled.

Much of what Africa is now was determined by her recent past and her colonial experience. African systems were overwhelmed by Western systems which offered material alternatives to traditional African ways.

Essential to traditional African systems is the availability of plenty of land into which their ever-growing numbers can spread. An example of this is the so-called Bantu migration, which, over a long period, carried the black man steadily southward from his original home in Central Africa into Southern Africa.

As a previous speaker has mentioned, in South Africa the Eastern parts are more generously watered then the Western parts, therefore the migration poured into this Eastern part. One of the nations that developed this Eastern part of the sub-continent was the Zulu.

History

One of the tasks in our Standard 5 year was to research the rise and fall of the Zulu nation. To achieve this we spent a week in Zululand to study the history and culture of these people, and their present status.

The Zulu people originated as a minor vassal clan of the powerful Mtethwa Tribe under the chieftainship of Dingiswayo. A wife of Senzangakona, chief of the Zulu, gave birth to a son Shaka, whose name means 'intestinal bettle'. He, in turn, began the great rise of power of the Zulu Nation.

He moulded the Zulu into a fighting machine, and the superbly trained, well disciplined brave men formed an army which made the Zulu the most dominant tribe in Natal and Zululand until the close of the nineteenth century. Shaka was assassinated by Dinghaan, his half-brother.

The Zulus tragically began to lose their power under the leadership of Dingaan, who, through his treachery, incurred the wrath of the Dutch Trekkers and the British Settlers who lived in Natal. This led to the eventual defeat of the Zulus at the hands of the Trekkers in the Battle of Blood River in 1838.

A further decline was accelerated by the leadership of the next king Mpande who was, at this stage, merely a vassal to the British. The power of the Zulus was finally deposed under the leadership of Cetshwayo, who, like Shaka, was a warlike chief, but in the battles of the Anglo-Zulu war of 1879 was defeated and later imprisoned in Britain. However, the pride of the Zulu was still great.

Culture

The culture of the Zulus is one of great interest. Their families are led by the patriarch and the work is divided evenly between the male and the female. The women of the tribe do the thatching, beadwork, pottery and the floors of the hut, as well as the cultivation of the crops. The men do the woodwork, hornwork, basketry and the making of the hut frame, which is beehive shaped and thatched all round. The Zulus are a pastoral people and the boys' responsibility is to herd the cattle. The villages in which they live are known as 'umuzi' which in English means 'homestead'.

The increasing population has caused the movement of peoples to the towns. Less than a hundred years ago most of the Zulus lived on the land sustaining themselves by what they produced by subsistence farming and the breeding of cattle. Urbanization has practically destroyed this system of self-sustenance, and the advantage of their way of life was never fully appreciated until they had been lost.

An industrial development has gained momentum in South Africa, more and more people have moved into the industrial regions in search of employment. Today, the rural areas are often under-populated and desperately short of labour. The children and elderly are left in the village while the able-bodied men turn to the towns to look for opportunities of which there are simply not enough, and the women, in turn, follow their men.

CONCLUSION

Unfortunately, with this increased migration to the urban areas, the rural and pastoral elements of the Zulu society is being affected. Proper farming methods are being taught and encouraged, but the Western way of life and the cities are an irresistible attraction. It must be remembered that the Zulus in Zululand are now managing their own affairs under their own parliment.

I will conclude with a quote from G.E.W. Wolstenholm's "Man from Africa."

> "I think it is Africa where man probably began, that can give hope of a new life. By an immense combined effort Africa can save itself and give time, a vital breathing space, to the rest of the world.
> Man everywhere needs Africa. Even more, I believe, Africa, so near to a fresh start, can set an enviable example to the older world."

IX. R.7 Jaavack, Adam. "Urban Conservation." Seventh Grade Student, Treverton Preparatory School, Private Bag 505, Mooi River, Natal 3300, Republic of South Africa.

(Our last student to speak is Adam Jaaback, who will talk on 'The Conservation of a City'. These are his impressions after our study of the seaport city of Durban in Natal. Here conservation and spatial geography are covered.)

The increasing advancement of our civilization is reflected in its effect upon our Environment. We are using up our resources and releasing pollutants into our natural system at a rate which places a great strain on its ability to adapt. Today, there is no part of South Africa which has not felt the impact of man.

Our modern cities are a highly artificial environment, with bleak vistas of glass and concrete and rivers which have been boxed in concrete and buried beneath streets. It is this artificial quality which sends city people by the thousands into more natural areas each weekend and holiday season. And yet there is no reason why our cities have to be such unnatural sterile, communities. With imagination and forethought and some expense, they could be turned into places where people enjoy living and which offer a healthier and a more relaxed way of life. Architects and city planners are becoming aware of this and some are making provisions in cities for recreation areas and green belts. Many buildings and complexes are being designed so that plants, trees, gardens and sometimes parks are part of the structures.

During our studies this year, we were lucky enough to take a trip to Durban to explore it as an Urban Settlement.

I took a look at the conservation of the urban settlement of Durban. Being a coastal city, I did not only study the conservation of the city but also the conservation of the beach and coastline and harbour there.

What is conservation? Conservation is the wise use of our Natural Resources. In my case, doing Urban Conservation, it means the wise use of the Urban Environment.

Whilst in Durban, as a class, we studied the life cycles of the area and the way that many of the natural communities have been affected by man. The main fact stressed greatly while we were there was that Durban bay was actually an important Estuary, full of life. When man moved in, urbanization began to take place and many of the

Natural Communities and life cycles died out. When Durban became a harbour, all thoughts of an ecological system were destroyed and as shipping and industry increased the conservation of that area was forgotten in its planning.

We were able to compare this with a small Estuary that has been conserved by the Durban authorities and we studied the habitats and Ecosystems that have been preserved there. The Umengi River estuary runs through Durban and it was there that we learnt about the importance of an estuary; and the surrounding habitats like the Mangroves and the Dunes.

Fish spawn at the mouths of estuaries and it is here that the fish swim into the upper estuary for food and protection. It is here that we find the smaller organisms that feed larger fish and mammals in the area, and naturally, where they occur, crocodiles. This means that any change in the water affects not only the inmates of the estuary, but also the fish populations from the surrounding coastal shelf, to which the estuary is a vital producer.

Whilst at the Umegeni Estuary we studied a mangrove community. These swamps are dominated by the mangrove and few other trees occur. Algae grows thickly on the trunks and parts of the mangrove below high water level, and phytoplankton is washed into the swamps at high tide.

Mangroves are important because they help to hold the banks of the estuaries together, provide oxygen and form habitats for important estuarine food webs.

Between the Mangroves and the sea, we studied the role of the important sand dunes. The plants of our coastal dunes, from the pioneers to the climax forest community, all play a vitally important role in creating and maintaining a stable environment along our shore line.

We did not only study the conservation of flora in its natural community, but we also visited a few centres and reserves for the protection, conservation and rehabilitation of fauna and flora. An excellent example of this is Stainbank Nature Reserve. This is a nature reserve in the middle of Durban which does not only provide homes for giraffe, zebra, impala, bushbuck, grey duiker, and other small animals but also filters the cities pollution by absorbing carbon dioxide and releasing fresh oxygen, making it very important for educational purposes and ecological functions.

We also visited C.R.O.W. the "Centre for Rehabilitation of Wildlife". In an urban environment animals will obviously be hurt or affected by man. Many oiled-up birds are found on the nearby coastline and rehabilitated. CROW also plays a part in educating the public and schools.

CONCLUSION

South Africa boasts a wide diversity of wildlife, flowers, trees and animals. Unfortunately, we tend to be accustomed and careless about them. True, our birds are coming back to old and established suburbs rich in trees. In Durban water fowl and game birds come back to the ponds on the reclaimed water works. Our towns and cities could, however, do better. Hills, ridges and streams could become

Refuges for Wildlife if we but allow it. Unfortunately many of our bigger city and town parks are 'formal' gardens with exotic species of trees and flowers, our hills or high ground are the suburbs for the rich, and even worse, the sites for huge flat complexes and our rivers are channeled into lifeless concrete canals.

Through my study I believe that people living in Urban areas should become more Environmentally aware. Certain organizations are doing good work in Environmental Education in Durban but it is up to the public sector to stimulate action for better Environmental conditions in our cities.

IX. S. Smith, Elizabeth H. "Environmental Education and the Gifted Student: a Survey of Some International Programs in Schools".

The same characteristics which set gifted students apart from their classmates equip them to understand the complex interrelationships of the environmental realm. These are the students whose creativity, idealism and marked intellectual abilities to conceptualize, synthesize and generate ideas can be enhanced by environmental education curricula. Their skills and insights into problem solving are a natural resource, a fact now recognized in school programs around the world. The study examined reports on environmental education programs for gifted students in Korea, Malaysia, Australia, the United Kingdom and the USA.

IX. T Smith, Kay M. "Rationale and Activities for Early Childhood Environmental Education: The Effect of the Home and School on Environmental Learning". Director of Teacher Education, Loyola University of Chicago, 820 N. Michigan Avenue, Chicago, Illinois 60302, USA.

In the recent whirlwind of reports by educational commissions, private foundations, and other evaluating bodies, the lack of science education in United States' schools and of science knowledge of United States's students is lamented. Many points to solutions like requiring more credits in science at the high school level. I propose another solution. It seems to me essential that we begin with a child's natural curiosity about scientific relationships at a pre-school age. The title of my presentation is: Rationale and Activities for Early Childhood Environmental Education: The Effect of the Home and School on Environmental Learning.

Mary Budd Rowe notes the need for inquiry-oriented science instruction and for students to see every day applications of their science knowledge. Such science instruction can begin at a very young age and environmental science lends itself particularly to inquiry programs by its nature and content. Inquiry programs include activities which arouse students' curiosity and prompt spontaneous exploration of ideas. This curiosity and exploration is important for environmental education in its capacity for involvement by families. The role that persons and families play in maintaining the environment is significant.

The first step in teaching young children science is the use of the discovery method. When compared with other learning methods, Selim found the discovery method superior in producing learning. The discovery method translates to teaching what the child is currently attending to and allowing exploration (Tucker, 1976). This technique is easily communicated to parents. Barsch (1969) recommends that parents be approached as individuals and that teachers avoid jargon. Swick and Duff (1978) note four behaviors that teachers should develop in order to interact more effectively with parents. Teachers should exhibit:

1) flexibility
2) approachability
3) sensitivity; and
4) dependability.

Another way to teach young children through their parents is by sending activity sheets home for families to do together. Some tips for developing a relationship with families to produce an environment in which parents will use teacher suggestions are provided by Long (1982):

1. Send a welcome note to parents.
2. Conduct some learning sessions for parents.
3. Establish a classroom newsletter; this is a perfect forum for send home activity sheets.
4. Keep parents informed of current school science and environmental topics.
5. Use the telephone to reinforce.
6. Encourage parent assistance with home projects or school projects.
7. Periodically make home visits.

Algozzine provides a caution for using parent assistance in the classroom. She reminds teachers to make the most of volunteer services. She suggests that teachers assess the needs and talents of the volunteer, allow them to correct papers (but be sure to give them an accurate key), let volunteers share pertinent life experiences or provide opportunities to students, use volunteers to do research on new teaching methods or assist students in research projects (a volunteer might have time to see where the caterpillar is going), and use volunteers to link to the community.

The link to the community is a special role for family involvement in environmental education. Part of the objective of environmental education is to educate the larger community. Small children learning and practicing environmental services (clean-up activities) can galvanize a community in a way that nothing else can. Another aspect of using a parent volunteer as a classroom aide is to allow more activity diversity and a link to the outside world. Young children often think of teachers as living at school (that's the only place you see them, right?) but another child's parents really "knows" about the community. Environmental education activities in school but provided by parents can have special impact. Obviously having another adult in the room also expands the capacity for a variety of experiences via small group work or learning centers.

Activities for home and school learning should be based on a rationale that derives from the science world. Yager (1984) notes the need for elementary science curricula to do more integrating and to address affective environmental science dealing with energy, natural resources and acceptable environmental quality. These concepts can be dealt with when teaching young children by simple exposure which is followed by capitalizing on children's questions. The whole concept of custodianship can easily be developed in young children by allowing them to do it. Follow a caterpillar and make sure no one steps on it. Look for rocks or twigs and assume the responsibility of cleaning up the school yard trash that obscures them.

Young children as beginning readers are not candidates for text book methods of environmental education. This is good as teachers too often succumb to the temptation of the text book method of science. Yager and Penick (1984) contend that the supremacy of the text book is a serious limitation of science learning and regret the fact that the investigative or laboratory dimension of science it almost totally ignored. Environmental education meets the complaint from teachers and parents of a shortage of laboratory equipment and space. The nearby environment is the laboratory. Jackson (1984) reminds teachers of Dewey's insistence on the experience of "doing" science, experiencing its frustrations as well as its excitements. This method is supported in nearly every corner of science education. Environmental education should consist of guided inquiry and extensive parent-child and teacher-child communication (Rowe, 1983).

Finally, it is crucial to recognize and capitalize on the pre-disciplinary world of young learners. Without barriers of artificial division, children learn readily (Hawkins, 1983). This is enhanced by diverse materials and observation of natural phenomena. These sustain and increase children's natural curiosity. School is only one component of the total mileu of children's opportunities for learning; family life, peer association and the big world are part of the opportunities, too, and should be drawn into the conspiracy to foster environmental learning.

Activities for young children in environmental education can center around such general areas as conservation, cyclical relationships, equilibrium, change, time and space, and renewable and non-renewable resources. Related topics such as the evaluation of effects, the influence of values and helping versus hurting the environment may also be explored.

From these general areas, specific topics for learning activities are generated. Wind, vacant lot projects, plants and food, and song makers in nature are examples. These topics lend themselves readily to learning activities for pre-schoolers.

Activities for learning occur in two general locations - the school and the home. School activities can include nature walks, learning centers, field trips, coloring activities, televison or filmstrip lessons, scrapbook creations, presentations, "laboratory" experiments, integration with other subject areas (language arts, math), and guest appearances (people, animals, plants).

Activities for home learning may be shared with parents in a variety of ways. Special television workshops and a section or column in children's or parents' magazines are possible. Activity sheets or home learning recipes are another way to give specific suggestions to parents for learning at home. A local resource brochure or activity book provides additional ways of communicating with the home. Several specific suggestions for home and school learning activities will be available on handouts at the session on preschool environmental education at the conference.

IX. U. Stayton, Vicki and Jenne Pool. "Environmental Education and the Young Child." PhD Candidate, Department of Special Education, University of Illinois, Champaign, Illinois 61820, USA; Center for Environmental Education, Murray State University, Murray, Kentucky 42071, USA.

Young children seem to learn best through concrete, direct, hands-on experience. By using all of their senses to observe and explore the world around them, children begin to develop concepts and perceptions about their environment. The role of the teacher in this process is to continually provide activities and allow for situations through which children can expand their experiences and develop more complex concepts. This workshop, based on a 15-hour workshop presented annually at Murray State University, Murray, Kentucky, was developed by the facilitators based on their own experiences in working with young children. This two hour workshop was designed to provide teachers of children aged 3-8 years with specific activities that can be used with children in the outdoors, to provide them with teaching strategies that facilitate working with children in the outdoors, and to share resources containing environmental education activities for young children. This was accomplished through hands-on activity, discussion, and perusal of curriculum materials. In addition, participants received a reference list of curriculum materials appropriate for young children and written descriptions of the workshop activities.

IX. V. Stubbs, Harriet and Marylou Klinkhammer. "Acid Precipitation Information/Education/Curriculum Materials". Executive Director, The Acid Rain Foundation, Inc., 1630 Blackhawk Hills, St. Paul, Minnesota 55122, USA.

Acid Deposition -- a global problem and issue. What information can you, as an educator, utilize? Act locally! Information was presented about instructional materials at the elementary and secondary level; resource materials from international, national, regional and local sources; information from many different viewpoints, and audiovisuals.

IX. W. Wilson, Terry L. "Taking a 'BYTE' out of the Energy Problem: Bit by Bit." Director, Center for Environmental Education, Murray State University, Murray, Kentucky 42071, USA.

Microcomputers are becoming a part of classroom environments in schools at an ever increasing rate. Instructional software is being developed quickly in an attempt to provide school personnel with connections to their curricula and instructional efforts. In the fall of 1983, the Center for Environmental Education at Murray State University received a contract from the Kentucky Energy Cabinet to survey instructional software available in the area of Energy Conservation. The goal of the survey was to evaluate those programs available, in both the commercial and public domains, and to disseminate the results of the survey to public schools in Kentucky. The software is being evaluated by a panel of experts that includes classroom teachers, university professors, energy resource persons, and the project staff. The evaluations covered content, process, applicability in educational settings, and the 'user-friendliness' of each program examined. The presentation included an explanation of the project and its results, as well as hands-on exposure to selected software.

X. A. Dayton, Thomas G. and Roger Allen. "Attitude Changes of Youth at Environmental Education Residential Camps". Environmental Education Coordinator, Youth Employment and Training Programs, Traverse Bay Area Intermediate School District, 890 Parsons Road, Traverse City, Michigan 49684, USA: North Central Michigan College, 1515 Howard Street, Petosky, Michigan 49770, USA.

Since 1981 the presentors have been measuring changes in self-perception by low-income youth, ages 16 to 21. This attitude change is part of a controlled experience and is compared against the youth's reference base. Measurement is taken in environmental education work/study residential summer camps in northwestern Michigan. Since 1981, approximately 250 youth have been tested. The pre and post-test are designed to measure the youth's change in locus of control. An increase in environmental awareness is intended to create an attitude change which promotes greater involvement in matters of self determination.

Locus of control is defined as a distribution of individuals on a continuum according to the degree to which they accept personal responsibility for what happens to them. INTERNAL individuals believe that their own actions influence outcomes. EXTERNAL individuals perceive that outcomes are not due to their own efforts, but to luck, fate, or other influences.

These summer camps are operated by the Youth Employment and Training Programs, and are located in rustic settings. Economically deprived youth are employed at the camps five days per week during the summer. Instruction in construction skills, forestry/biology, and environmental awareness is provided. Youth receive high school or college credit for completion of the program.

The presentation included descriptions of: (1) design and implementation of the camping program, (2) relationship of program to youth attitudes, and (3) study methodology and findings.

X. B. Hanie, Robert. "Biocultural Education: A Post Industrial Education Process." Associate Professor of Citizen Action and Human Ecology, Environmental Studies Program, Sangamon State University, Springfield, Illinois 62708, USA.

The purpose of this paper is to comment upon the end of the industrial era, to examine its stepchild, our existing industrial educational process, to restate certain natural premises of education, to take cognizance of the character of post industrial America and to describe a five year experiment in creating a post industrial educational process.

The Passing of an Era, 1865-1982

In a recent press bulletin of the U.S. Bureau of Labor Statistics appear these significant words: "Employment in the consumer, financial and service industries has moved above the job total in the production industry for the first time in the history of the American economy...In discussing what he called an economic milestone, Samuel E. Ehrenhalt...said the changed relationship reflected not only a shift toward a service-oriented economy but the weakness in goods production..." New York Times, July 6, 1982. This brief official statement marks the closing of a great historic movement.

The passing of the industrial era has rendered much of the settled area of our country into a vast wasteland. Indeed, a trip through these Roszakian Badlands around Bosnywash, San Difranangles and Pittsdechicago resembles a post nuclear nightmare. In the future by digging into the strata of these areas, post industrial archeologists will find the symbols of this important era of our past. What they will find and can easily reconstruct is the image of its God, Science. "The mindscape (and landscape) to which our culture has been shaping itself over the past three centuries--and with ever more decisive urgency since the advent of industrialization--is the creation of modern science" comments Theodore Roszak in Where the Wasteland Ends. It is science which has produced unparalleled material gains and the bourgeoning loss of wilderness, species, communities, health, society and spirit. In his keynote address to the First Global Conference of the World Future Society at Toronto in 1980, Willis Harman spoke of the effects of science "...it has led to an unnoticed bias in the knowledge base of industrial society. The quantifying, measuring, prediction-and-control emphasizing methods of science have brought fantastic gains in knowledge about the sense-perceived world... Along with these gains there has been an ignoring of, and even a bias against, systematic exploring of the 'other half' of human experience--the realm of inner experience of conscious and unconscious mental activities..." Consciousness has been described as much like an iceberg - only minute part of it can be perceived by the senses. The unconscious realm covers a vast new frontier: intuition, vision, spirit, the creative process, imagination, autonomic functioning, reflexes, dream-like, habitual behavior, memory, pattern recognition, conceptualization.

American Industrial Educational Processes, 1965-?

American education is and increasingly has been since 1865 another industrial process. Our educational system has developed a corresponding thought process with industry which is at once rational, objective, reductive, linear and pragmatic. American industrial education has produced an "Incredible Hulk" of reading, writing and arithmetic on the one side of the student, and an "Invisible Man" on the other side which has hardly been developed. The very traits we need to get us through the challenges as we approach 2000 AD - the main one being survival - are those most neglected: creativity, intuition, imagination, joy, hope, aspiration. Public education is presently undergoing one of its periodic reviews. The last serious critique was in response to Sputnik in 1957. Five major appraisals of American educational processes appeared during 1983. Not one mentioned the passing of the industrial era. Not one mentioned the transitional nature of our time. Not one mentioned the need for an educational process that deals with the so-called other half of the self. Objective education, like science, is a cultural artifact of industrial America. In this time of transition from an industrial era to a post industrial era it would seem wise to devise an alternative educational process. For not only is the industrial educational process outmoded, the computer, the culmination of industrial communications devices, will take over the linear functions of that paradigm.

Nature, The Grand Teacher of Preindustrial America

Nature is the source of all learning. Education is an ancient process of adaption. It is an attempt to grasp nature in a fashion plausible to the time and convey it to the children of a given generation. Shamen and professors have been doing this for thousands of years. Nature was the grand teacher to the people of preindustrial America. Fredrick Jackson Turner spoke eloquently of this in his watershed address before the American Historical Association in Chicago in 1893: "The Significance of the Frontier in American History:... that coarseness and strength combined with acuteness and inquisitiveness; that practical, inventive turn of mind, quick to find expedients; that masterful grasp of material things... that restless, nervous energy; that dominant individualism, working for good and for evil, and withal that buoyancy and exuberance which comes with freedom --- these are the traits of the frontier.." Such is the magic of nature which Carl Jung like Henry David Thoreau before him has said is the source of all creativity. Nature is not to be found in the objective Cartesian-Newtonian defined methodology that we were taught in grammar school, nor in the Kuhnian derivative, normal science, enforced upon us in latter life, nor in the curiously shrivelled words of Jacob Bronowski. What we need is an "artistic method" of inquiry that is as powerfully indeterminate as the scientific method has been determinate.

The Springfield Experiment, 1979-?

The premise of the Springfield Experiment is that we are living in a time of transition, a time which bears witness to the decline of an old myth and paradigm and the rise of a new myth and a new paradigm. While no one book or document expresses its philosophy, it will be built around linkages to all the energies of the earth, the self and the future. The Springfield Experiment has attempted to devise a subjective educational process which is post-industrialy based, mythologically oriented utilizing pictorial symbols to categorize and define reality to link to the existing objective educational process which is industrially based, scientifically oriented and mathematically defined. The result is a process which incorporates the best energies of the both paradigms. We call our experiment Biocultural Education for it attempts to link all the traits of nature and culture and to consider them in both a rational and intuitive fashion. It could also be called education with the corpus callosum in mind (or spirit). Our curriculum is based upon the premise that education should mimic nature, not industry. (400 students have spent up to 13 weeks in our program which will enter its sixth summer during 1985). Our curriculum attempts to trace the journey of humankind through a thematic approach which is divided into three parts: Primal Studies, Historical Studies and New Studies. It utilizes the methods of guided imagery, meditation, kinesethetics, journal keeping, dream work, vision quest, song, story and dance, other approaches to creativity and intuition, etc. All of this is in addition to traditional education and traditional courses which are taught concurrently. Besides yearly goals, objectives and themes the program encourages three major undertakings by its faculty and students: the development and understanding of one's own personal myth, the development of at least one technical proficiency, i.e. computer programming, along with a thorough understanding of the history of technology; and, the exploration of avenues of connections between the world of technics and mythos.

Conclusion

Hans Christian Anderson's story of the "Nightingale" could probably stand as the metaphor of our time. A wondrous nightingale is imprisoned by a king so that he can always have music of unsurpassed beauty. The nightingale finally escapes. The king falls ill. The music box built to mimic the nightingale breaks down -- after constant playing. The nightingale intuitively returns as the king approaches death and sings him back to life. Then the king accepts the bird on its own terms -- just so he can hear the wonderous music occasionally. Of such is the story of human nature in our time. Of such is the story of our health as a species. It is hoped that we will have time to learn to accept nature on her own terms and that our lives will become attuned to the rhythms of nature. Of such should be our education.

X. C. Fortner, Rosanne W. "Environmental Education Adoption Potential of Inservice Workshop Participants in the U.S. and Barbados." Assistant Professor, School of Natural Resources and Coordinator of the Ohio Sea Grant Education Program, The Ohio State University, 2021 Coffey Road, Columbus, Ohio 43210.

Formal education programs frequently include teacher training as a mechanism for dissemination of environmental information, curriculum materials, teaching techniques and the like. Diverse evaluation strategies gauge the effectiveness of such programs in terms of their impact on the teachers themselves, their curricula, and their students. Rarely, however, are such programs evaluated for their potential among differing populations. Reviewing the literature of inservice education likewise does not provide such indications of potential, because reports usually do not include a complete characterization of the participants.

The literature of education contains many studies related to factors that facilitate the adoption of innovations. If it is assumed that the infusion of environmental education into formal school settings constitutes an innovation for many, the adoption literature can provide an important means of predicting the success of inservice environmental education programs.

This study was designed to incorporate the adoption literature with a comparison of teacher characteristics from inservice Environmental Education workshops in two different cultures. The questions to be answered were:

(1) What characteristics of teachers, of school situations and of inservice programs are related to predictable adoption of educational innovations?

(2) What are the characteristics of the voluntary participants in inservice Environmental Education workshops, in Barbados and in Ohio (representing the United States)?

(3) How do the workshop participants perceive the characteristics of the school systems that employ them?

(4) What are the participants' needs for inservice Environmental Education?

(5) What is the likelihood that the participants will adopt materials and methods used in the workshops?

WORKSHOP DESCRIPTIONS

Four inservice environmental education workshops were conducted in 1983-84, two in Barbados and two in Ohio, U.S.A. The workshops differed in funding source, presenting faculty and to some extent subject matter, but there were many similarities as well. All workshops included faculty from the Ohio State University, School of Natural Resources, Division of Environmental Education. All had as their goal an increase in environmental awareness among participants and the development of positive attitudes toward the environment, as well as encouragement to use non-text curriculum materials and open investigative methods for instruction.

The format of the workshops consisted of (1) introductory activities for acquainting participants and instructors and establishing a precedent for interaction; (2) alternate periods of subject matter presentations and hands-on activities; (3) field work; (4) group projects and individual activities. For all portions of the workshop the instructors encouraged involvement of all participants. (Complete workshop descriptions are available from the author.)

Some workshops were prepared in advance for distribution to participants. These consisted of curriculum materials from the Ohio Sea Grant Education Program, Projects COAST and ORCA, subject matter outlines, and other activities developed by the instructors specifically for the local environment. All materials were evaluated during use and after the entire workshop was completed. In addition, each participant was asked to produce an original or adopted curriculum activity as a final class project. This served as a means of applying information from the workshop and making an immediate transition of the methods into the classroom situation. The teacher-made materials were compiled and returned to all participants.

PARTICIPANT CHARACTERISTICS

Each participant of the four workshops completed a Teacher

Questionnaire which requested demographic information, a description of the teaching situation, and an assessment of the school's facilities and potential for environmental education. The number of males and females did not differ significantly between workshops, nor did the age of participants, which ranged from 25-55. Ten percent of all participants were school or school system administrators. The grades taught by the classroom teachers ranged from kindergarten through twelve, with more elementary teachers in Mentor, Ohio, and other workshops having a range of grades represented. Of the Barbados teachers, 60-70% had the equivalent of a Bachelor's degree. Thirty to 40% of the Ohio teachers held graduate degrees and 60% indicated they had taken three or more courses since completing their highest degree. Seventeen percent of Barbados teachers had this number of courses.

A. School Characteristics

As for teaching situations, 1/3 of teachers in both countries reported teaching more than 100 students per day. The subjects taught varied in Barbados with the announced content of the workshop; in Ohio, 40-50% of participants taught all elementary subjects, and another 40% were science or social studies teachers. For all groups, 75% taught using a required textbook. The mode of instruction most commonly used in all workshop groups was a total group instruction.

The school situations represented were quite varied. Half of the Ohio participants claimed that "a reasonable amount of money" would be available for new activities they might develop, but only 22% of the Barbados teachers expected such support. All Ohio participants indicated that their schools could provide for trips away from school, while 1/2 of the Barbados teachers would find this impossible. Both groups (70-89%) regularly use classroom activities that are not included in their textbooks, but many (36-50% U.S., 83% Barbados) found their schools' environmental education library holdings and other facilities to be less than adequate.

Teachers in all groups expressed satisfaction with both teaching as a career and their own teaching situations, with up to 61% of the Ohio teachers claiming to be very satisfied. Sixty-four percent of Barbados teachers and 15% of U.S. teachers had never taught environmental topics.

Participants were asked to indicate how important it would be to include certain topics in future environmental education workshops. Responses differed between the two cultures, with Barbadians expressing greater needs for assistance with development of materials for strategies to evaluate both learner outcomes and teacher effectiveness. All groups indicated that teaching methods and local applications of subject matter were of greatest importance. U.S. teachers in elementary schools considered it important to actually work through the curriculum activities, while middle and high school teachers wanted assistance with curriculum development.

CONCLUSIONS

Based on these factors it is likely that teachers involved in the four workshops have a better than average potential to becoming adopters of the innovative techniques and materials presented. Many of the adoption facilitation factors were intentionally built into the total workshop program, and it is hoped that these factors will outweigh the potential problem areas.

The Teacher Questionnaire should be modified to accomodate the cultures of other countries and to collect more information on community characteristics and professional activities of the teachers. This would facilitate prediction of workshop success.

In future workshops an effort should be made to involve school administrators on a larger scale, especially in developing countries. These individuals can not only encourage innovation but also provide the follow-up support that may not be possible through overseas communications systems.

In order to extend the results of this research, three questions are offered as a basis for cooperative efforts with others working in environmental education for developing countries:

1. What testing instruments are suitable for measuring teacher characteristics in different cultures?
2. What teacher characteristics facilitate adoption of educational innovations in developing countries?
3. Can adopter characteristics be developed or can their acquisition be facilitated by providing training and experience in innovation?

Educational change has historically moved at a glacial pace. Perhaps there are ways to speed innovations by combining the results of previous research with what we have learned of the educational systems of different cultures.

X. D. Hines, Jody M. "An Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis". Assistant Professor, University of Northern Iowa, Cedar Falls, Iowa 50613.

Responsible environmental behavior includes those behaviors initiated by an individual with the aim of remediating an identified environmental problem (Peyton, 1977). The development of individuals who intentionally engage in such behaviors is the overriding goal of environmental education (Roth, 1970; Hungerford & Peyton, 1976; Stapp, 1971.).

This goal is not one which can be easily attained and indeed it has not as yet been realized (Roth, 1981; Hungerford & Volk, 1983). The process of altering human behavior is extremely complex and is dependent upon possessing knowledge of variables which influence the desired behaviors. Such information is vital to the environmental educator for its potential in terms of providing a sound empirical base on which to construct appropriate curricula for the successful development of environmentally responsible behaviors.

Despite a significant increase in empirical research in this area over the past decade, research efforts have not provided environmental educators with a clear picture of the necessary components of such an educational program. While a tremendous variety of variables have been investigated in relation to behavior in an environmental context, there is at present, no agreement among researchers as to which of these variables appear to be most strongly associated with responsible environmental behavior.

The research reported here attempted to address this problem. An analysis and synthesis of environmental behavior research was conducted in an effort (1) to determine those variables which have been identified in the research as being associated with responsible environmental behavior, (2) to determine the relative strengths of the relationships between each of these variables and responsible environmental behavior, and (3) to develop a model of variables associated with environmental behavior which would be most representative of the research synthesized in the investigation.

The primary methodology employed in accomplishing these goals involved the use of the Schmidt-Hunter meta-analysis techniques (Hunter, Schmidt, & Jackson, 1982). Meta-analysis is the term applied to groups of precise statistical methods designed to integrate empirical findings of studies addressing the same relationship. Meta-analysis allows the researcher to determine the relative strengths of the associations between the variables investigated and responsible environmental behavior and thus provides a means of showing which aspects of the relationships are truly important and which are only thought to be important.

Environmental behavior studies were located as a result of an exhaustive search of the literature. The search covered research which had been reported since 1971 and included published works, dissertations, and fugitive literature. A list of 380 studies for possible inclusion in the data set emerged from this search. Sixty-five of these works could not be located. Of the remaining 315 studies, 128 were found to contain empirical data on the relationship between any number of variables and responsible environmental behavior and thus provided the data for this study.

Characteristics and findings for each of these studies were transcribed onto coding sheets. Analysis of this data revealed a number of broad categories of variables which had been researched in association with responsible environmental behavior. These categories included cognitive, personality, and demographic variables as well as a category of experimental studies comprised of behavioral intervention approaches and classroom strategies aimed at encouraging responsible environmental behavior. These categories provided the organizational structure for the meta-analysis of the data.

The following findings emerged from the meta-analysis:

1. The variables which were found to be most strongly associated with responsible environmental behavior and the relative strengths of

these associations, as represented by an average correlation coefficient were: a. an individual's intention to take action (r = .491), b. locus of control (r = .365), c. attitudes toward the environment and toward taking action (r = .347), d. personal responsibility felt to help alleviate environmental problems (r = .328), and e. knowledge of environmental issues and of the modes of taking action on these issues (r = .299).

2. Extremely weak to non-existent relationships were detected between the following variables and responsible to human behavior: income, age, educational level, gender, and an individual's economic orientation.

3. The behavioral intervention studies which were meta-analyzed were all found to be effective in increasing the incidence of responsible environmental behavior. These strategies and their corresponding average r values were: a. the use of verbal and written appeals (r = .707), b. the offering of incentives (r = .690), c. providing information to subjects (r = .472), and d. providing feedback to subjects (r. = .267).

4. The mode by which behavior was assessed was found to have a moderating effect on study outcomes. In most cases, higher correlations between the variables assessed and environmental behavior were obtained from studies in which measures of actual behavior were employed as opposed to those studies which relied upon self-reported behavior assessments.

5. Study outcomes were affected by the population sampled. In all cases, higher correlations between the variables assessed and responsible environmental behavior were detected in those studies whose samples were comprised of individuals with ties to an environmental organization (e.g. Sierra Club).

6. Experimental design was found to have moderated study outcomes. In most cases those studies which employed pre-experimental designs reported substantially larger changes in behavior than were observed in quasi-experimental and true experimental design studies.

Based on the findings summarized above and on additional findings presented in the original research (Hines, 1984), a model of environmental behavior was formulated. One essential component of the proposed model was an individual's intention to take action, which while directly linked to behavior, also appeared to be strongly influenced by, or perhaps merely an artifact of, a number of other variables operating in combination. These other variables included cognitive knowledge, cognitive skills, personality factors, and situational variables.

The model's pathway implies that before an individual can intentionally act on a particular environmental problem, that individual must be cognizant of the existence of the problem. In addition, that person must also possess knowledge of those courses of action which are available and which will be most appropriate in a given situation. Another critical component related to behaving responsibility towards the environment appears to be skill in appropriately applying this knowledge to a given problem. These cognitive skills, combined with the appropriate knowledge, endow individuals with the abilities needed to act upon environmental problems.

However, in addition to possessing the ability to act, an individual must also possess a desire to behave responsibly. One's desire to act appears to be related to a host of personality factors. These include attitudes, locus of control, and an individual's sense of personal responsibility. A person who possesses positive attitudes toward the environment and toward taking action, who has an internal locus of control, and who feels a personal responsibility to help solve environmental problems, will be more likely to behave responsibly toward the environment than will an individual who does not possess these characteristics.

The proposed behavioral model also indicates that situational variables such as economic constraints, outside intervention, and opportunities to choose different actions, may enter the picture and serve to either counteract or to strengthen the operation of those variables in the model. For example, if an individual has the ability, desire, and opportunity to help stop pollution by contributing to a local toxic waste fund, but simply cannot afford to do so, that person will not engage in the environmental action. Situational factors may also act to increase the incidence of responsible environmental behavior. For instance, a person may curb energy consumption only to save money. While this person obviously possesses the knowledge and abilities to conserve, his actions have likely not stemmed from a deep-seated desire to conserve fossil fuels for the good of society and of the environment as a whole, but rather from personal and financial bases. Thus, in situations in which individuals do not possess those personality characteristics which lead to a desire to help alleviate environmental problems, these individuals may be enticed into behaving responsibly by the manipulation of situations in which environmental behaviors are rewarded and anti-environmental behaviors are penalized.

Meta-analysis of the data did not allow the determination of the interrelationships between each of the factors in the proposed model. In addition, this research was limited by the nature of the variables which researchers have chosen to investigate. In that where only one or two studies were located on a particular relationship (e.g., adrogyny vs. behavior), findings were not meta-analyzed. Despite these limitations, however, it is possible to provide environmental educators with knowledge of those factors which appear to be essential to the development of environmentally responsible individuals.

The proposed model indicates the necessity of the development and implementation of environmental educational approaches which address both affective and cognitive experiences and which provide individuals with opportunities to develop and to practice those skills necessary to act on environmental problems. While the research synthesized in this investigation was unable to specify precisely how the affective component might be addressed in the EE curricula, the knowledge and skill components can be addressed via issue identification, issue investigation, and action-taking approaches (Ramsey, 1979; Klinger, 1980). It is essential that EE curriculum development efforts become more focused on these aspects if the ultimate goal of environmental education is to be achieved.

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X. E Panel: "Predicting Environmental Behavior." PANEL CHAIR: Harold R. Hungerford, Professor, Southern Illinois University-Carbondale, Illinois 62901, USA. PANELISTS: Audrey N. Tomera, Professor, Southern Illinois University-Carbondale, Trudi L. Volk, Assistant Professor, Murray State University, Murray, Kentucky; Archie P.C. Sia, Assistant Professor, Rockhurst College, Missouri; Jody M. Hines, Assistant Professor, University of Northern Iowa.

The development of environmentally responsible and active citizens has become the ultimate goal of environmental education (Hungerford &

Peyton, 1976; Roth, 1970; Stapp, 1971). A national survey of professional environmental educators, conducted by Volk (1983), found overwhelming support among environmental educators for the importance of this goal. Yet these same individuals also feel that this goal is not being achieved. Volk points out the pressing need to develop new curricula which address the environmental behavior goal.

One of the major impediments to the accomplishments of this goal has arisen as a result of a lack of knowledge of those factors which influence the development of environmentally responsible individuals (Linke, 1980). Bruvold (1973) considers this problem to stem, in part, from a lack of theory to guide environmental behavior research. In order to ameliorate this shortcoming, a theoretical framework for environmental behavior prediction is needed.

Hines (1984) has taken a step in the establishment of such a theoretical framework by conducting a meta-analysis of environmental behavior research. Meta-analysis consists of a group of explicit, unambiguous and operationally defined methods for integrating empirical research findings (Hunter, Schmidt, & Jackson, 1982). Applied to environmental behavior research, such techniques allow the determination of the relative strengths of the relationships between the variables which have been researched and responsible environmental behavior. Thus, meta-analysis provides a means of determining which relationships are truly important and which are only thought to be important.

In Hines' study, an exhaustive search of the literature was conducted in an effort to locate empirically based environmental behavior research which had been conducted since 1971. This search yielded a list of 380 studies for possible inclusion in the data set. Of these, 128 studies were found to contain empirical data on the relationship between a number of variables and responsible environmental behavior. Analysis of these studies resulted in the emergence of a number of broad categories of variables which research has found to be associated with responsible environmental behavior. These categories include cognitive variables, psycho-social variables, and demographic variables. Six of these factors mentioned above were shown by the meta-analysis results to be associated with responsible environmental behavior. These variables, along with their average correlations, are: (1) an individual's intention to take action ($\underline{r}$-.491), (2) locus of control ($\underline{r}$ - .365), (3) attitude toward some aspect of the environment or toward taking action ($\underline{r}$ = .347), (4) personal responsibility felt to help alleviate environmental problems ($\underline{r}$ = .328), and (5) knowledge of environmental issues and of the modes of taking action ($\underline{r}$ = .299).

Based on the findings mentioned above, and on additional data summarized in her research, Hines formulated a model of responsible environmental behavior. The essential components of the model include an individual's intention to take action, which, in turn, is directly linked to an individual's knowledge of environmental issues, knowledge of how to take action of these issues, skill in the application of this knowledge to environmental issues, and to a number of personality factors which include attitudes, locus of control, and personal responsibility.

Some of the variables mentioned in this model have been investigated by Sia (1984). Sia's research examined the relative contributions of eight variables in predicting overt environmental behavior. These predictors were: (1) level of environmental sensitivity, (2) perceived knowledge of environmental action strategies, (3) perceived skill in using environmental action strategies, (4) perceived individual locus of control, (5) perceived group locus of control, (6) psychological sex role classification, (7) belief in/attitude toward pollution, and (8) belief in/attitude toward technology.

Stepwise regression revealed that the best predictors for all respondents, accounting for 49.24% of the variance, were perceived skill in applying environmental action strategies (34.54%), followed by level of environmental sensitivity (12.92%) and knowledge of environmental action strategies (1.78%). Separate analyses of the comparison groups, Sierra Club members and an Elderhostel group, revealed that the best predictors for the Sierra Club sample, accounting for a total of 40% of the variance, were perceived skill in applying environmental action strategies (30.15%) and level of environmental sensitivity (9.85%). The best predictors for the Elderhostel sample, accounting for a total of 64.50% of the variance, were levels of environmental sensitivity (45.24%), skill in the application of environmental action strategies (13.41%), and group locus of control (5.91%).

Together, the descriptive studies conducted by Hines and Sia provide support for the importance of specific knowledge, skill, and affective components in the prediction of pro-environmental behavior. Yet, these studies are correlational in nature; evidence of a causal link between these variables and environmental behavior cannot be gained from studies such as these. However, experimental studies reported by Ramsey (1980) and by Klinger (1980) do provide the support needed concerning the importance of these variables in the development of environmentally responsible individuals.

In a quasi-experimental study, Ramsey (1979) investigated and compared the educational and behavioral outcomes of two discrete EE methodologies, one directed at issue awareness and the other focused on environmental action training. The case study group was exposed to information concerning knowledge of environmental issues and knowledge of how to act on some of these issues. A second treatment group not only received knowledge of environmental issues and how to take action on these issues, but also learned issue investigation skills, identified implicit value positions associated with environmental problems, autonomously investigated environmental problems, and applied environmental action strategies to real environmental issues. One of the dependent variables measured was student's self-reported overt environmental behaviors above and beyond those associated with school.

Analysis of the post-test results revealed that the action group reported engaging in a significantly greater number of overt environmental action behaviors than did either the case study or the control groups. In addition, no significant differences in the number of self-reported behaviors reported by the control group as compared to the case study group were detected following treatment.

Klinger (1980) applied the same instructional model used by Ramsey and concluded that the instruction did result in a significant increase in overt environmental actions reported by students. He further inferred that there appeared to be a relationship between environmental action training and the desire to engage in further environmental actions.

These studies provide further evidence for the importance of the inclusion of knowledge of environmental issues, knowledge of environmental action strategies, and the opportunity for the application of this knowledge and skills to real issues. The findings of the Ramsey and Klinger studies also emphasize that knowledge without the skills needed to apply that knowledge to the problem, does not result on the desired behavior changes. If we are to meet the goal of environmental education, which is to produce environmentally responsible citizens who can work for a balance between quality of life and quality of environment, it is imperative that those predictor variables identified in the research summarized above be addressed in EE curriculum development and instructional practice.

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IX. F Larson, Mark A. "Theory Building in Environmental Education." Associate Professor, Journalism Department, Humboldt State University, Arcata, California 95521, USA.

That future history will be a race between environmental education and environmental catastrophe is quite clear. Therefore, environmental educators have set out to help bring about informed environmental policies for society that will be compatible with the maintenance of a suitable planetary environment (Pettus, 1976).

In order to accomplish this, environmental education must produce a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware and skilled in how to become involved in helping to solve these problems, and motivated to work toward their solution (Stapp, 1969). Presumably, then, it would serve society if it were known how to more effectively change individuals into "environmental activists," i.e., "persons who have changed or directed their lifestyle to include more environmentally sound practices (such as reducing energy and resource consumption) and have worked in society, either individually or with groups who shared their goals, to conserve natural resources and to slow, halt or prevent environmental and ecological problems, crises or pollution in any form" (Larson, 1977).

The difficulties of this task have been compared to the difficulties of the early alchemists:

> ....Environmental communicators often arrive at a purpose closely parallel to that of early alchemists who sought to transform less

> desirable metals into gold. The environmental communicator, too, begins with a material of lesser quality - the unlovely human mind, in many instances wholly lacking in environmental awareness and ecological values. The communicator hopes to add something to the cognitive material that will elevate it to a state of "ecological conscience." ....The problem is to discover the manipulations, the treatments that bring this transformation about (Schramm, 1973).

Unfortunately, it is still true, despite Lowenthal's (1972) early criticisms, that while research contributions to the understanding of environmental perception and behavior have increased in number, the field as a whole remains essentially unorganized and disjointed. What is lacking is a unifying theoretical model which brings together the range of variables that may account for variability in environmental activism, and which could serve as a framework for organizing previous research findings:

> It is only the construction of theoretical edifices and the invention of constructs and postulation of processes ... that will allow us to interpret the meaning of our empirical findings and to engage in cautious but essential generalizations to situations different from those dealt with in a particular study (Wohlwill and Carson, 1972).

This research proposes, therefore, a theoretical model to use as a guide while investigating influences in the socialization process of environmental activists. The socialization of environmental activists is conceptualized as the process by which an individual acquires environmental attitudes, values and interests; knowledge of environmental problems, motivation to participate in environmental activities; and a psychological identification with a reified group called "environmental activists."

THEORETICAL OVERVIEW

The term "socialization" is usually defined as: processes by which individuals learn to participate effectively in the social environment (Ward, 1972); as the whole process by which an individual develops, through transactions with other people, his/her specific patterns of socially relevant behaviors and experience (Zigler and Child, 1969); or the process by which individuals acquire the knowledge, skills and dispositions that enable them to participate as more or less effective members of groups and society (Brim and Wheeler, 1966).

A key assumption of the socialization perspective is that to understand human behavior, researchers must specify social origins of that behavior and the processes by which it is learned and maintained (McLeod and O'Keefe, 1972). Simply making a roster of the socialization influence upon environmental activists is viewed as a difficult and probably dysfunctional task, however, because of their potentially unlimited number. Instead this research proposes to include in this model of the socialization process of environmental activists only the major categories of influence variables commonly used in socialization research. This model expands upon one of the few attempts in the literature on environmental attitudes and behavior to explain in schematic fashion the range of influences on an individual which affect behavior (Sonnefeld, 1972), and an outline of the major problems in political socialization research (Dennis, 1968).

Figure 1: MODEL OF SOURCES OF INFLUENCE IN THE SOCIALIZATION PROCESS OF ENVIRONMENTAL ACTIVISTS

Learning Process Maturation Generation Action/Reaction Style

a. Cross-cultural Variation

Agencies

b. Sub-cultural Variation

Interaction STIMULUS FIELD + INDIVIDUAL Environmental Activism

Content Feedback

System Relevance

Environment

Each influence category describes different input, but all interact in the final socialization process since the influence stimuli must go through the individual before being translated into behavior. The model does not emphasize any one influence category, until research findings are available to support modeling main effects.

The model is then used as a theoretical framework for organizing research that already exists in the area of environmental attitudes and behavior. Here, the socialization influence categories are defined briefly, along with suggestions for their use in future research into environmental attitudes and behavior.

SOCIALIZATION INFLUENCE CATEGORIES

System Relevance:

When we look at a number of individuals collectively in a social movement, we can look at the body of shared knowledge, values, attitudes and behaviors that set that social movement apart from the rest of the population. As researchers, we need to discover the body of shared knowledge and environmental values, attitudes and behavior which maintains environmental activists as a social movement. We also need to explore the most effective means of building membership in the environmental movement.

Content:

Environmental content is that information which is transmitted to new members of the environmental movement which results in persistence of that movement. We need to study variables like environmental interest or concern, environmental information, party identification, organization belonging and left-wing ideology, but we also need more explicit analysis of types of environmental content crucial to the effectiveness of environmental socialization.

Maturation:

If the circumstances of environmental learning are likely to affect its character and relative transience or permanence, then we should also analyze the development of environmental socialization across the life cycle. The developmental antecedents of social attitudes and behaviors are the goals of researchers looking at maturation from a socialization perspective. We will need longitudinal data bases for this type of research.

Generation:

In a second temporal dimension, generational variation results from differences in experience of members of society who are born at different times, and these differences in experiences may become incorporated into the environmental socialization process. The research problem is to discover how different each generational experience has been or is likely to be and to understand what impact this difference and its effects may have when the new generation participates in environmental matters.

Action-Reaction Style, Cross-Cultural Variation:

This influence area concerns itself with variation in the socialization process across different government systems. One could conduct cross-cultural comparison research with environmental activism in different countries where it exists as well as look for reasons why environmental activism does not appear to exist in other countries.

Action-Reaction Style, Sub Cultural and Group Variation:

Differences in environmental activism within cultures and between groups due to sex, socio-economic status, religious preference, regional and geographical variation and so on are the objects of analysis under this influence area. The research questions usually asked are: How extensive are these differences and how persistent?

The Learning Process:

We need to attempt to formulate a learning model of environmental learning that goes beyond describing what society (the system, its agencies, the teachers) does to or for the learner. Dennis (1968) suggests the major thrust of past socialization research has been upon what the society does for the individual. A different approach would be to observe the self-adaptive activities of the individual -- how he or she attempts to make sense or an environmental system which he or she had no part in creating; this may include self-socializing activities as well as displays of resistance to society's socialization efforts.

The Agencies:

It is still important to know who teaches what to whom in the socialization process, so we need to identify which agencies have roles in given settings. How much influence does each have and what is the direction of influence? What factors explain the effects that each agent may have? The answers to these questions could vary from system to system, stratum to stratum, and early to late life-cycle periods, depending on how important a role was played by the agency.

Interaction:

This influence area includes all social contact with other individuals since communication is viewed as facilitating socialization, as well as being a product of that socialization. Mass media use is included in this area. As researchers, we need to know media use patterns, information-seeking behavior and which interaction influences are most important in the socialization process.

Feedback:

This influence area represents the individual's awareness of: (1) the actual efficacy and consequences of action, and (2) responses from other persons regarding that action. These represent information to the individual, and we need to know whether that information could stimulate further environmental socialization and action or perhaps lead to inaction.

Environment:

Sources of influence within this category include actual geographic or spatial reference, physical data and individual perceptions of one's natural and man-made or -influenced surroundings. We can analyze whether these physical and cognitive variables may be stimulating or inhibiting the socialization process.

SUMMARY

Researchers in the field of environmental socialization also need to ask: What are the types of environmental orientations and their spread over segments of the population? What is the leadership training and motivation of the "elite" environmental activists? Does this specialist training differ from the general environmental activist socialization process?

The most important task is to summarize the extant literature in environmental attitudes and behavior, according to the theoretical framework offered here. Theory should be used to decide which variables to study, and this sort of literature review should identify areas where we need to direct future research. It should also provide more solid ground for generalizing about the "alchemy" of environmental education.

LITERATURE REVIEW

What follows (available upon request) is a summary of research findings.

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X. G. Lubbers, James D. "Analysis of College Students' Attitudes Toward Technology as Related in Environmental Problems." Assistant Professor of Science Education, SUNY College at Fredonia, Fredonia, New York 14063, USA.

INTRODUCTION

People often view technology as either having caused or able to solve most environmental problems. Neither extreme is realistic by itself and, in fact, both conditions are valid to an extent. In courses where the role of technology is discussed or implicated in some relationship to environmental issues, students may often be confused or influenced by the biases inherent in much of the information presented. Understanding such attitudes can be of great importance in helping students learn about the causes of and solutions to environmental problems. Attitudes of students enrolled in Sci 100 (Contemporary Topics in Science) or Sci 231 (Pollution/Environment/Society) at the State University College at Buffalo during 1981 to 1983 were examined. The purpose was to compare the effects of the course content, identify any trends or changes in attitudes among students throughout the two-year period, and to compare over-all attitudes with attitudes of students at Indiana University (Lubbers, 1984).

SIGNIFICANCE OF THE PROBLEM

It is a well known fact that technology has both positive and negative consequences. Unfortunately, many of the negative consequences have been recognized too little or too late. Understanding how people feel about technology (broadly defined as aspects of our technological system) is an important first step in helping people understand environmental problems. The causes of and solutions to environmental problems involve a myriad of factors relating to technology, any of which can be defined on a continuum from "purely system" to "purely individual" in their orientation. Knowing which factors are which (cause or solution) and where they fit (system or individual) are often open for debate, and depend largely on a person's attitude toward and understanding of the technological system. Valid identification of these factors depends on having a balanced perspective concerning the role of technology in society, and any bias for or against technology will automatically skew one's perspective. If attitudes can be recognized, and if educators can promote a little more consistency among attitudes, the outcome should be a more streamlined and efficient decision-making process.

Environmental problems have helped people realize the "Faustian Bargain" they have with Science and Technology (S&T) where they must learn to accept the bads with the goods. Since it is easier to blame S&T for the bads (rather than taking responsibility themselves), public support for S&T has eroded in recent years.

This change of attitude is important for several reasons and carries with it many implications for education. First, it indicates a fundamental change in the public perception of S&T which must be reflected in the manner in which S&T issues are presented in the classroom. Second, it reflects a better, more objective balance of perspectives regarding the impacts of S&T in society which, in the long run, should help to minimize the negative impacts. Although it can be argued that people cannot maintain an ambivalent or contradictory position for very long (Bybee, Harms, Ward & Yager, 1980), at least understanding (but not necessarily accepting) other viewpoints, can lead to earlier resolutions of conflicts. Third, the change in attitudes signals the realization that all impacts of S&T, both positive and negative, must be examined in order to achieve a rational balance between technological growth and environmental preservation. In the classroom, educators now have the opportunity and responsibility to refocus and, in effect, synthesize their concerns regarding the role of S&T in society.

PROCEDURES

This study was based on the development and validation of a survey at Indiana University (IU) in 1980, to measure attitudes toward technology as related to environmental problems (Lubbers, 1984). The survey was based on the constructs, PRO- and ANTI-technology, which would help define attitudes characterized, respectively, as believing that S&T will solve environmental problems, and, that S&T have caused environmental problems. The survey was administered to a total of ten sections (5 each) of two different courses (Sci 100 & Sci 231) from 1981 to 1983 at the SUNY College at Buffalo (SUCB). The purpose of this study was to see if a deliberate attempt to present technological and environmental issues in a neutral fashion would have any effect on students' attitudes toward technology, and also, to identify any trends over time and to compare the results with attitudes of students at IU in 1980.

At SUCB, both Sci 231 and Sci 100 were introductory science courses taken by a large percentage of the student body, mainly to meet the science requirement for graduation. Five sections of each were taught by the investigator during the period from Fall 1981 through Spring 1983. These courses were designed, within limits, to address the nature of contemporary problems and issues facing society, with Sci 100 focusing on the impacts of technology, and Sci 231 focusing more on environmental issues. Since both of these courses were "science" courses, it was predicted that the results would be similar and would most closely match those of students enrolled in E200 (Environment and People) at IU. Also, at IU, there was little change in attitudes during a one-semester period, so significant change in attitudes among students at SUCB was not expected. Regarding the two-year time frame of administering the survey at SUCB, each class was a matched pre-post measure with that group of students--no attempt was made to measure attitudes of the same students over the two-year period. The net effect was simply a larger sample of students. No trends were evident for the period 1981 to 1983 for students enrolled in either course.

Responses to the 28-item Likert scale were coded 1 through 5 for strongly agree/agree/neutral/disagree/strongly disagree by each student. Mean percentage response distributions (PRDs) and subscale means for the 14 items of each subscale, PRO and ANTI, were used to characterize attitudes. Since there were no significant differences between attitudes of students in either class or among students in different semesters, data for all ten sections were combined for a total N of 215. The results were examined for pre and post changes and compared with responses of students at Indiana University (E200 students only, N of 95).

RESULTS

For students enrolled in E220 at IU and for students enrolled in both courses at SUCB, changes in attitudes were very small pre to post but were in the "right" direction. For both groups (IU&SUCB) the mean PRDs and subscale means were "less extreme" on the posttest than on the pretest. Extreme agreement or disagreement with the items on either subscale was considered to suggest an unrealistic attitude toward technology as related to environmental problems. The most extreme case would be if all respondents were to completely agree or disagree with all items on one subscale and do the opposite on the other. This would illustrate an absolute imbalance of perceived differences in the two roles of technology--causing or solving problems. A more realistic interpretation of attitudes would be to recognize a baseline condition or generally accepted and prevalent attitude toward technology where there is some degree of ambivalence present. This situation would be characterized ideally by 100% agreement on both subscales, PRO and ANTI. Since such results could not be expected realistically, a best case effect of course content in changing attitudes would be to strive for matched means and PRDs on both subscales regardless of absolute percentage values. Such is the case with the data derived from both study groups. There is greater agreement with the PRO subscale than with the ANTI subscale for the pretest, but the values are about the same for posttest, thus reflecting an "improved" balance of attitudes.

Subscale means were also used as a method for describing attitudes as measured by the survey. Item means on each subscale were averaged to provide subscale means for each group pre and post. Any value less than 3.000 would indicate agreement with that subscale, and, as with the mean PRDs, identical values on the two subscales would indicate a balance of perspectives, whether agreeing or disagreeing. The means, as you would guess from the PRDs, were closer in value for the posttest than for the pretest for both study groups.

There were no significant differences pre to post. However, results for the two study groups are very similar. Both illustrate slightly less agreement with the PRO items pre to post, and slightly greater agreement with the ANTI items pre to post. In addition to the consistency between the two groups as measured by the survey, these results also suggest that attitudes toward technology are relatively uniform among selected college students from different parts of the nation and have remained quite stable among that age group since 1980.

SUMMARY

Support for technology has traditionally been somewhat stronger (NSB, 1981; Taviss, 1972). The findings here and by others (Bybee, et al., 1980; Etzioni & Nunn, 1974; NAEP, 1979) would suggest that this support is on the decline, especially among the younger generations, in that an "anti" technology attitude is becoming a major concern. Increasing ambivalence may be an improvement as long as it doesn't become a problem in and of itself in generating indifference or confusion. With luck, anyone who begins to see the dilemma facing society, will also realize that something must be done about it. Understanding attitudes toward the role of technology is an important first step in helping educators meet the needs of people as well as society.

Deliberate attempts to present a balanced perspective regarding the impacts of technology on the environment and on the way we live can lead to a more rational and realistic understanding of the role of technology in society (Lubbers, 1981). Such an understanding can, in turn, possibly help us identify the causes of the many problems facing society and perhaps improve our ability to solve them. If these perspectives get out of balance, it is plausible that the natural environment will get the short (shorter?) end of the trade-offs between technological growth and the preservation of the natural environment.

If we do not become more environmentally responsible, our ability to modify the world will be severly diminished for us through natural limits to growth. We must recognize our dependence upon both the natural and built environments in every decision we make.

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X. H Mills, Terence J. and Francis Fendersen. "Children's Concept of Earth: Preconception for Understanding the Biosphere."

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What an experience it would be to step out into space and view the earth in this way, to visualize for the first time our planet as a whole. How sobering it must be to realize the earth's unique position in the solar system. How much more we might appreciate and value our relationship to the envelope of life and the planet it surrounds if we could take this viewpoint? Unfortunately, at present, this experience is reserved for the select few who have traveled in space. Being earth bound, how does one develop a holistic view and appreciation of our planet?

Investigating elementary children's understanding or "notion" of earth is the focus of the research presented here. From an educational standpoint, development of the earth notion has significance for instruction and curriculum development in the social sciences as well as the physical and biological sciences. The concepts of earth's shape, gravity and position in space are included in the study of subjects such as geography, history, astronomy, physics and ecology, to mention a few. Perhaps most important is the significance of the earth notion to concepts in the field of environmental education. Our earth is a finite body in space. Children all around the world must grasp this idea before we can expect them to deal with the interdisciplinary aspects of environmental education and the necessity of international cooperation for conservation of resources and pollution control. The awakening of a sound environmental and conservation ethic may be predicated by the development of a notion of earth as a finite body in space.

Armed with the knowledge of how we develop our concept of earth we may better apply our collective efforts to maintain and appreciate that which sustains us.

The intent of this study was to identify earth notions held by elementary students in a rural Oklahoma community and some of the significant independent variables related to development of these earth notions. Using the structured individual interview procedures suggested in previous studies on earth notion, it was possible to identify and categorize the earth notions of Kindergarten, 2nd, 4th, and 6th grade students. Results of these interviews support the finding of past research. Children in rural, U.S.A. hold generally the same notions of earth as did children in other studies. Suprisingly, the distribution in the rural U.S.A. sample was skewed more toward upper notion levels than was the distribution in previous research. This seems to support the idea of greater development of spatial perceptual ability for rural children. However, interpretation of the results must not overlook possible discrepancies. The pre-interview activities conducted to ensure better rapport with the U.S.A. children may also have improved the responses.

A number of independent variables have been included in past research to help account for the variance in earth notions by children nd have been found to be significantly related. Of these, age, sex, grade, parents' years of education, achievement scores, verbal ability, and spatial ability were included in this study in an effort to further validate these findings. Although support was found for the significance of all of the above sources of variance, verbal ability, spatial ability, achievement scores, and sex were determined to be the more reliable predictors of notion level. Other studies had not looked extensively into the sources of information in the home and school contributing to earth notion (with exception of Mali). However, both were found to be statistically significant in this study. The parent and teacher surveys were successful in identifying important experiences children have been exposed to, and further development and refinement of these instruments should be continued.

There is a degree of readiness for earth notion subject matter as early as kindergarten. In the kindergarten sample, 18 percent were classified at level 4 and another 13.6 percent held notions 2 or 3. Of those kindergarteners who demonstrated a relatively high understanding of earth concepts, most had been exposed to a wide variety of family experiences in the home, including travel, books, science museums and especially discussions with parents.

Many experiences, although intended to clarify meaning and further the child's understanding, may in fact further elaborate their misconception. The 6th graders in this study may be an example of such a case. Twenty-six percent of the 6th graders interviewed believed we live inside the earth (Earth Notion level II). These students were generally average in verbal ability and achievement scores. How did these preconceptions develop? These students had received formal instruction beginning in 2nd grade and yet their understanding is seen as conceptually naive when compared with external criteria. One surprising explanation for this anomaly came during a discussion about why they believe we live on a flat surface into the middle of the sphere. Several students related their experience in 5th grade of visiting a planetarium. They talked about how the sky looked curved and how we were in the middle. It seems very possible that the root of their alternative framework was the experience of seeing the sky projected on a curved ceiling with a flat floor at the planetarium. We can see here the importance of exposing these ideas before they become stable and the foundation on which the child attempts to assimilate later learning. Although this explanation is yet untested, the implications should be of special interest to planetarium directors and all instructors alike.

The emphasis in the earth notion research to date has been placed primarily on understanding the development of children's concepts, improving methods for exposing their ideas and developing better instructional strategies. The importance of the earth concept itself, although it may have been implied, has been a secondary emphasis. As advances in technology continue and as natural resources become more and more a limiting factor, the significance of this basic concept becomes increasingly clear.

Children develop basic attitudes at a young age, and when those attitudes are guided by major misconceptions, the effect may be carried into adulthood where significant resource management decisions are influenced. The research reported here supports previous studies showing the prevalence of alternative frameworks in children of many ages even after receiving formal instruction. Attitude toward the earth's resources and a sustained high quality of life will be influenced by how we perceive our planet. Although it has not been the purpose of this study to investigate children's attitudes toward the earth, the need for such research is evident.

Future Exploration

A number of unanswered questions surfaced as a result of this study. For example, during interviews with K and 2nd grade children, the influence of older siblings on younger children's level of understanding was sometimes mentioned. This source of variance needs further investigation either as part of the earth notion interview or as part of the home survey.

It has been suggested that the interview itself may be instructional. Therefore, an experimental design with an interview followed by another interview one to two months later could offer important suggestions for development of improved instructional design.

Textbook authors and environmental curriculum planners should consider the major preconceptions of children when developing curriculum materials. Teachers' guides need to include ideas for sequential concrete experiences for teaching concepts such as earth's shape, gravity and position in space. Existing texts should be analyzed to determine contents that contribute to earth notion development. It would be beneficial to have discrepant event activities included in texts to create cognitive dissonance and stimulate children's accommodation of a more mature earth concept.

Classroom teachers must become aware of children's preconceptions before beginning any environmental education. It cannot assume that because a concept was covered last year the child has accomodated the necessary learning free of major misconceptions. It is essential to begin where the child is and this requires more listening on the part of teachers to assess this level. Correct answers on paper and pencil tasks are not always the best measure of the child's true level of understanding. As suggested in other studies, the Piagetian clinical interview method should be utilized more often by classroom teachers to assess student progress. For example, two students expressed a belief that gravity is in the atmosphere pushing things down.

This kind of preconception must be identified by the classroom teacher. In fact, additional interview questions need to be included which explore this preconception. It is very possible that other level 4 children may have held this idea however it was not identified in this study.

Kindergarten children must not be ignored! Other studies found 2nd graders with definite alternative frameworks already in place. These ideas certainly had their roots in much earlier experiences. Any real attempt to understand the development of the earth concept and its influencing factors should begin before major preconceptions develop. Developing a rich base of experiences at the primary and preschool level will certainly enhance the growth of preconceptions compatible with mature concepts. An environmental earth notion teaching unit should be developed and tested in kindergarten.

The curious question of the effect of trips to the planetarium on children's notions of earth will require further study before any serious conclusions may be drawn. A pre-interview followed by a planetarium trip and post interview would be a good place to start. Perhaps one group might have some preparatory remarks prior to the planetarium show to sensitize them to the discrepancy in their perception while another group would receive no explanation. The possibility that the planetarium environment promotes developing a level two earth notion needs investigation.

Finally, and perhaps most important, children's attitudes toward conservation of resources, the biosphere or other environmental issues could be correlated with earth notion. Would children with less egocentric views of the earth have more positive attitudes toward conservation of natural resources? If so, this would add real support to the importance of developing level V earth notions in students. In addition, the earth concept's place in research and curriculum development, especially in environmental education, would be given appropriate emphasis.

The study reported here supports research from California, New York, Israel, and Nepal. Regardless of the cultural setting of the sophistication of the population, major alternative conceptual frameworks of the earth do exist. In addition, it would seem that children worldwide develop similar notions about the earth. Educators concerned with promoting a greater understanding and appreciation of our planet, earth, should find the research presented and cited here of special interest. We must join in a global effort to understand the nature of development of the earth concepts in children and the relevant experience promoting development of these concepts. With this knowledge we may have greater educational impact on children who upon becoming adults must make responsible decisions concerning the resources of a finite earth.

X. I Nelson, Ray A. "Cognitive Models for Developing Global Perspectives on Environmental Problems." Professor of Education, Bemidji State University, Bemidji, Minnesota 56601, USA.

A visitor from another plant observing the American System of Education might easily conclude that in the beginning "God created the discipline." Since the earliest population explosion (in the Bible-where the begating begins!) humankind has seen fit to divide, dissect and parcel out the "Body of Knowledge" for convenience sake. We have become experts at creating "experts " who have in depth knowledge greater than the world has ever known! Indeed we need those experts but in our rush to create knowledgeable experts we have failed to stress the connections between disciplines.

Harlan Cleveland (1984), Director of the Hubert Humphrey Institute of Public Affairs, University of Minnesota put it this way, "we have gotten very good at producing experts. But the limiting factor to our civilized energies is our capacity to get it all together...to relate the parts of the whole...to see the interconnections among the disparate 'facts', to play the intervals as well as the notes. The important thing about any process is not its isolated components; what makes them dynamic is the connections between and among them."

In yet another context John Naisbitt (1983) in his best selling book Megatrends echoes Cleveland's contention by stating: "We are moving from a specialist who is soon obsolete to the generalist who can adapt."

In the modern highly technical world we live in today specialization is very useful but also creates tremendous problems in solving our problems. Specialists fall into the trap of trying to solve problems as if they are isolated and not related to anything else.

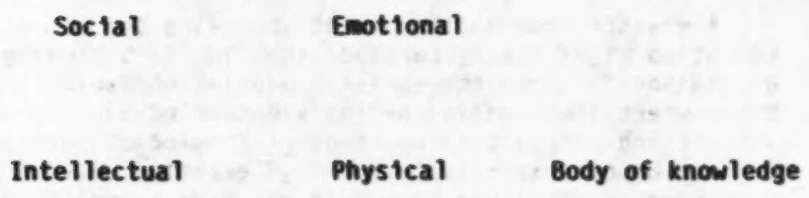
Pollution for example is a natural, social, economic and political problem. A solution to a problem such as pollution must take into account these factors and consider long term, broad based ecologically sound solutions instead of short term seemingly simple solutions.

In summary, our educational systems must teach the basics in a global perspective and to be more effective our specialists need also to be generalists. It is this writer's thesis that to deal with the global environmental problems we need people who can process, synthesize, and interrelate the various aspects of environmental problems (social, political, economic and scientific). To assist the learner in this difficult and somewhat foreign task we will take a look at some cognitive process models that may help in interrelating and internalizing global information.

The process of relating factual knowledge into a coherent vehicle involves a number of components. Probably the first and most important is a scheme for taking in and categorizing knowledge so that it can eventually be processed and internalized.

Figure 1

Individual Model



If one visualizes the four circles in Figure 1 as wheels on a car representing various known components of the individual and therefore the sum total Body of Knowledge about individuals then the inter-relationships begin to appear. For example, suppose for a moment you had a broken leg (just suppose)! To study the total impact on you of a broken leg we would plug the event into the physical wheel of the car. It becomes obvious immediately that the damaged physical wheel of the car causes difficulties for the other three models and thus the operation of the total vehicle (you). Damage any other wheel of the car and the results are the same.

Let's assume for a moment that each of us is a microcosm mirroring the world (macrocosm). Using the analogy of the world and its parts as a macrocosm and fitting it in to the "car" paradigm (Figure 2) one begins to see the interrelatedness of all things.

Figure 2

Soil H2O

Air Lifekind Body of knowledge

Using the analogy of the self as a car being a microview and the earth as the macroview one can make the "cognitive leap" of viewing all life processes in the same car analogy framework.

Using a "cognitive" leap to relate a microcosm to a macrocosm one can see the interrelatedness of all things. (Figure 3)

Figure 3

Microcosm Cognitive Leap Macrocosm

By injuring a wheel of the paradigm one alters the functioning of the whole.

The world is an extremely complex interrelated system. Our lifestyle and technology has given us the means to knowingly as well as unknowingly tamper with it.

Pollute the environment and all life will have to readjust accordingly.

Let's reverse the process of thinking our world to pieces, and start thinking the world back together again.

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X. J. Peterson, Ervand M. "A Research Alternative in Environmental Education." Visiting Tutor at Deakin University in Geelong, Victoria, Australia. Present address: 2213 Magnolia Ave., Petaluma, California 94952, USA.

Prior to the 16th century most of the planet's population viewed the world as organic. Individually and as groups, people related to nature in organic relationships shaped by spiritual and physical phenomena. The Church and Aristotle were the authorities of this view and the framework which defined it. This science was rooted in reason and faith, seeking to ultimately understand the meaning and significance of things. In the 16th century this loving, organic, and spiritual universe was replaced by that of a great machine.

It was Francis Bacon who proposed that society should begin building a true method of the universe such as it is in fact, not as a man's own reason would have it be. This method or way of representing the universe would be in the fashion of mechanics, where there is a "true" model: one that is beyond man's own reason, one that can provide an objective understanding of the workings of the universe. Bacon proposed that this objective knowledge would allow people command over things natural - over bodies, medicine, mechanical powers, and infinite others of this kind.

Isaac Newton adopted this mechanical view and applied its principles to the phenomena of nature dealing with material in motion and mathematical methods to explain the universe. John Locke, the British empiricist, further applied these ideas to knowledge and its assessment, seeking to analyze not the extent, but the certainty of our knowledge. He argued that primary qualities of existence - bulk, shape, and motion - could be measured, thus establishing certainty about the object.

John Stuart Mill further ingrained the material and mechanical world view upon society. Mill states that "all things possess quantity: consist of parts which can be numbered; and in that character possess all properties which are called properties of numbers." These writings supported Newton's work and the deductive character of the physical sciences which led to presenting the universe as all phenomena operating in accordance with mathematical laws. Thus the world became a part of Bacon's "true" model in which an objective quantifiable understanding was paramount - the scientific method.

The scientific method has four criteria which emerge as central: objectivity, measurement, control, and generalizability. The goal is prediction oriented toward the discovery of theories that anticipate future occurrences with maximum probability.

It is this reductionistic approach and tradition of classifying that is linked to the development of science as an ideology and the sciences of medicine, biology, physics, economics, etc. This practice has continued to be refined and accepted by society to where "science" is viewed as "the" reality and "real" research.

Gregory Bateson made the following comments concerning present day education and research as "obsolete" referring to:

> What Bacon, Locke, and Newton gave to the physical sciences is out of date in 3 different ways: a. Pragmatically, it is clear that these premises and their corollaries lead to greed, monstrous over-growth, war, tyranny, and pollution. . . . b. Intellectually, the premises are obsolete in that systems theory, cybernetics, holistic medicine, ecology, and Gestalt psychology offer demonstrably better ways of understanding the world of biology and behavior. c. As a base for religion, such premises become clearly intolerable and therefore obsolete about 100 years ago. In the 18th century, William Blake saw that the philosophy of Locke and Newton could only generate 'dark satanic mills' (Bateson, 1979).

Bateson expresses the need to move away from the present mechanical view of the universe. The positivistic image of the world is unnatural; we must delve more deeply into the actual patterns of the universe.

Bob Sample states that the world is an open system which operates on the premise of inclusion, not exclusion as in a closed system. The former being holistic, self-generating, and repatternable, while the latter is digital and linear.

In the Western tradition we operate in a reductive mode - breaking larger preconceptions down into components. We like the pieces, rather than wholes. The result is "a kind of philosophical chauvinism that ends in an elitism of reasons." (Samples, 1982).

Consequently, truth and fact have become that which fits into the world of pulleys, levers, and falling objects. Thus our view of reality has become closed and fixed and we are not accepting of open systems as having "value" or of being able to study them as "science".

The situations in which environmental education occurs are open systems - nature centers, park trails, classrooms, community meetings, etc. They cannot be dissected into components and then assigned integers - these are holistic life phenomena which require different strategies and philosophy of research.

One approach which offers a more holistic view is a phenomenological/qualitative methodology. Philosophically, phenomenology does not view subjects as being passive participants capable of being manipulated but as individuals who are intentional and conscious beings.

A second tenet is that of the lived-world, the everyday world of values, purposes, rules, social organizations, other people, social roles, etc., all components real to us in our everyday lives. It is by going into this world that we gain an understanding of it. By becoming one with it is to understand its meanings or reality all at once, encountering the life-world and moving with it, not dissecting it into components.

This requires the researcher to become a part of the scene in order to analyze it through methods of observation or in-depth interviews. Gaining an understanding of the context is one of the tasks of the researcher - this is always affected by that moment in time, as well as by the experiences that the researcher and informants share.

The fourth tenet is the concept of bracketing. As we bring with us our baggage of previous experiences, history, prejudices, and prejudgements, we cannot deny their existence. The qualitative researcher cultivates the skill of acknowledging, critically examining, and attempting to temporarily suspend these preconceptions. S/he studies prior research and theory but attempts to look at the phenomenon with fresh eyes until experiences with the research setting suggests its relevance. Thus by suspending, or "bracketing" these and laying time out for oneself and the reader, the researcher puts his/her interpretation in a proper context.

A fifth issue is the dialogical nature that is essential to the research process. Through the dialogical process mutual understanding is reached by the researcher and subject. It is the result of exchange and naming of the world that the inner world is revealed to the researcher.

The next concept is that of process versus product. It is by revealing the insights, wisdom, and understanding the situation that the reader and researcher determines applications from research. There is not dependence on "experts" to create theories and laws from above, but a belief that ordinary people are capable of producing knowledge and analyzing it.

Finally the presentation emphasis is on communication to researcher and layperson alike. The style is more literary than hidden in jargon and pretentiousness. It seeks to paint a picture of the situation including textures, colors, feelings, etc. - a rich account of experience rather than a superficial one.

In conclusion this qualitative approach is well suited for environmental education as it seeks to reveal the integrated nature of our world and the participants who shape it. Environmental education situations are so variable that researchers must be sensitive to the uniqueness there and become one with it to understand and reveal its essence.

X. K. Puntenney, Pamela J. "Environmental Education and a Responsive Policy-Making Process: Pattern of an Essential Alliance." Environmental Education Consultant, Research Associate, School of Natural Resources, The University of Michigan, Ann Arbor, Michigan 48109, USA.

"Think Globally, Act Locally"..."Man and the Biosphere"..."Global Ecosystems"..."One Earth"..."Development Strategies", familiar phrases to environmental educators and seemingly an enigma when viewed within the larger context of organizational efforts. Continued environmental degradation and rising concern for the "Quality of Life", shifting population dynamics, increasing technological innovation, and growing resource dependencies have and will continue to evoke major changes in social and economic frameworks. Since this interactive and rapidly changing set of cultural and environmental influences shape the direction of policies and programs, there is an increased need for the development of responsive structures, especially in the area of knowledge systems. But where does environmental education fit?

The relationship between pedagogy and environment is very complex and its past riddled with notions about disseminating and implementing environmental programs. As members of a global community, our avenues for education are but one small focal point when the environment, both natural and man-made permeates the life of the organization and then goes out through the individuals who share its various activities back into the larger society. Within this framework, our avenues for educating are more than their structural components. They are communities of values derived from the meaning of the world as experienced by its participants.

What is new and what is my particular aim here is to map dimensions of environmental education in an organizational context and to suggest that decision-makers incorporate a responsive view of environmental learning into the repertoire of perspectives on planning and management strategies. The discussion will focus on several questions: What constitutes a responsive policy-making perspective? What are the essential processes and contexts of learning in environmental education? And in what ways are organizational priorities linked to environmental education? While this effort is necessarily exploratory the purpose is to broadly consider what a knowledge systems' view of environmental learning might entail.

EE is Part of a Larger Picture

The idea of learning strategy rests upon the premise that environmental education is not an event per se but a process. Environmental education is essentially concerned with developing educational structures that will allow people to learn throughout their lives acquiring skills necessary "to work individually and collectively toward solutions of current problems and the prevention of new ones". In his article "One Man's Luxury is Another Man's Need: How Education Can Sharpen Our Awareness of Environmental Issues", Peter Fensham indicates that these issues involve: "social values, political organizations, economic policies and structures, technological control and development, and national and international patterns of distributing resources". This list suggests that organizations interested in educating people about the environment should not be isolated from the community and implies that their efforts should be socially based.

The environmental education movement has attempted to provide this impetus. Examples can be cited of great improvements in educational efforts but some key problems persist that suggest that EE is not a package to replace current priorities in an existing system or organizational effort but is a crucial aspect of a larger picture.

Since EE is a process that includes not only the natural but also the social system that has its own inherent dynamics, it is an approach to education that involves more than a particular mandate, training package, curriculum design, or specific project. It is a process essentially based upon relationships between the educator and the learner.

Julius Nyerere, President of Tanzania, explains that self-reliance is the key because people cannot be developed or educated. They must develop and educate themselves through a process of thinking, problem-solving, and acting. Problems have arisen with many international programs and projects because the educational component has been based upon old models that impose knowledge and values. Existing local or indigenous knowledge systems have been ignored or even undermined. These pre-dominate models assume that X's knowledge needs up-dating and if one just supplies that new information people's behavior will change. The consequence of this approach is that the chances of success are limited. The strength in Nyerere's vision is that it points to alternative paths for environmental educators based upon the integration of knowledge with personal experience.

Knowledge Systems and Organizational Effectiveness

The dynamic and interacting environmental factors point to the need for like models of education that are responsive to the rapid changes in environmental understanding and conditions. Rather than a single knowledge base, there is a need for knowledge systems comprised of an array of sources of information. David Hughes-Evans points out that schemes for holistic approaches to resolving the dilemma of how to begin to effectively address the complexity of environmental problems have emerged through such documents as the World Conservation Strategy developed by the International Union for Conservation of Nature and Natural Resources (IUCN) and Mankind at the Turning, the second report of the Club of Rome. But so far the educational implications of what has been proposed have not been adequately defined. As the tension builds between the benefits and costs of our environmental choices, the demand increases for the need to know how to learn. The education of the public and the training and retraining of professionals and decison-makers requires educational mechanisms that are a vehicle for keeping pace with rapid changes.

As organizations grapple with this issue, several models are emerging. From the business community, Mitroff suggests strategic planning using a stakeholders analysis. Schon explores professional knowledge and purports the idea of reflection-in-action through intuitive knowing. From the international arena, Drake et. al. show how useful insights that yield a variety of planning and intervention approaches must be based upon contextual and situational information. Models and issues are continuing to emerge around the notion of knowledge systems and effective action because the stakes are higher and the costs greater for not being able to respond appropriately. Each calling forth the important role participatory learning plays in understanding complex realities and deciding on a plan of action. So as environmental educators what is our plan? Are we fully aware of how we can form the necessary links between our aims and the priorities of society's systems such as literacy for formal schooling or long term change through development projects or corporate vitality?

Patterns

In studying the Oxfordshire, England system of education several key factors emerge that suggest the foundation for a learning strategy for environmental education. They are as follows:

1) A vehicle for communication is the lateral transmission and sharing of knowledge;
2) The role of education is based upon integrating personal experience with knowledge;
3) The focus of educating people about the environment is not on teaching and the imparting of knowledge, rather it is on learning practices and knowledge systems.
4) Environmental education is not an event per se but a process. Hence it is comprised of relationships that orchestrate learning strategies.

And in response to the First Intergovernmental Conference on Environmental Education, 1977:

> The notion of problem solving should be founded on the interest of the learner. Before "Environmental Education can help people acquire an awareness of a sensitivity to the total environment and its allied problems" and enable people to make decisions and to take action, the process must begin with the learner's awareness and sensitivity to some aspect of the surrounding environment, i.e. what they personally experience. Problem-solving is developed through the learner's powers. Self-reliance, learning how to learn, expressing ideas through a variety of mediums, and success are examples of factors that contribute to a responsive policy-making process and organizational effectiveness. These result in the development of problem-solving skills such as learning to assess information, being able to recognize and confidently utilize one's own personal knowledge and creative abilities, and developing a repertoire of communication skills. Therefore, it is essential that the learner's viewpoint be incorporated into the carrying-out of a broad-based responsive policy-making structure that provides opportunities that capitalize on this source of knowledge integration; this viewpoint is valuable especially as an integral piece of information for those charged with designing and developing methods, training programs, and an array of learning materials to facilitate the process.

X. L. Robottom, Ian. "Evaluation in Environmental Education: Time for Change in Perspectives?" Lecturer, School of Education, Deakin University, Victoria 3217, Australia.

"Modern" environmental education is closely associated with the work of the UNESCO/UNEP program in environmental education. The landmark events of modern environmental education were the conference at Belgrade (1975) and Tbilisi (1977), and the language of the environmental education movement is still dominated by that of the Belgrade Charter. One of eight "trend papers" presented at influential working sessions at Belgrade was on the topic of evaluation in environmental education. The question addressed here is whether the environmental movement is now in need of a change in perspective in evaluation.

The environmental education movement since Belgrade has had a chequered history, with contestation at various levels. There has been contestation at the level of language (does the essence of environmental education reside in its "education about the environment" form, or in its "education for the environment" form?); at the level of organization (is improvement in environmental education programs best achieved through centre-periphery approaches, or through local school initiatives?); and at the level of practice (what is the relationship between conventional teaching patterns and environmental education?)

The Belgrade trend paper on evaluation in environmental education was written at a time when considerable contestation and reconceptualization was also occurring in the field of educational evaluation. The hold of the dominant quantitative, scientific/analytic approach to evaluation (rightly exemplified in the Belgrade trend paper as "the state of art") became contested by interpretive and critical approaches. Methodological issues debated in this ongoing period of reconceptualization in the field of educational evaluation include epistemological dilemmas (is it reasonable to sustain a notion of objective knowledge?), ethical dilemmas (whose interests is the evaluation serving?), and procedural dilemmas (where does the locus of control of the evaluation reside?). However, developments in the field of environmental education appear to have been insulated from the influences of these debates in the field of educational evaluation. As the recent review of research in environmental education conducted by the NAEE shows, the dominant paradigm of evaluation in environmental education remains "scientific/analytic".

The proposition has been advanced (see "Editorial", Journal of Environmental Education, Summer 1982) that the appropriateness of conventional approaches to evaluation of environmental education needs to be regarded as problematic. The intention in this paper is to address this proposition by considering the resonances between two different perspectives to evaluation on the one hand, and commonly-accepted characteristics of environmental education on the other. Both perspectives to evaluation (scientific/analytic and critical) will be considered in respect of their epistemology, locus of control, and interests served -- in short, in respect of their "political theory". Finally, the argument will be advanced that the choice of evaluation paradigm for environmental education will be a deliberate one based on the relationship between the "political theory" of the evaluation, and the intentions of the program to be evaluated.

Scientific/Analytic Approaches to Evaluation

Scientific/analytic approaches are typically used to determine the effectiveness of a program. Congruence between goals and outcomes is measured quantitatively and presented as an indicator of program effectiveness. The evaluation design is one in which learners are pre-tested and post-tested, and attempts are made to identify and control most of the variables in the educational setting; the effect of the experimental variable (a changed activity in a program, or a "new" program) in achieving the program's objectives is determined. The instruments used to measure student performance are developed by the researchers; an appropriate statistic is employed to measure for statistically significant shifts in student performance in the groups "exposed" to the materials or activities of the program. Scientific/analytic approaches to evaluation are frequently used in the context of a centrally-controlled process of development of new curriculum materials (as in "Research, Development, Diffusion, Adoption" models).

Critical approaches to evaluation

Critical approaches to evaluation are represented here by action research. Action research is a participatory, democratic form of educational research for educational improvement. Action research recognizes that teaching, and educational practice in general, is complex, problematic and uncertain and takes place in a context that is complex, changeable and political. It is characterized by a method comprising recurrent cycles of three phases. There is a Planning phase, in which existing personal practice is regarded as problematic - the individual teacher looks for dissatisfactions, or areas with room for improvement, in his/her own teaching. "Dissatisfactions" and "improvement" are terms whose meaning is embedded in theoretical discourse about the nature and purposes of the innovation -- the sense in which a particular practice can be improved can be traced to a particular conception of the innovation held by the teacher. What is "planned" in this phase is a teaching/learning activity in which it is possible to exercise or manifest the sought-after improvement. The "Action" phase occurs when the plan is put into practice in an educational setting. In addition to trying to manifest a desired improvement in a teaching/learning activity, the teacher organizes a means of monitoring what takes place in that process (for example, the activity may be videotaped or audiotaped). The means of monitoring must be capable of detecting and recording when an improvement (in the teacher's own terms) has occurred. The third phase is "Reflection": in this phase, the data collected from monitored action is analyzed. In particular, the teacher reflects critically on the relationship of his or her practice (the monitored action) and his/her view of the innovation (the "theory" of innovation).

Action research, then, is mediated by praxis, a process of critical reflection upon personal practice engaged in by the teacher. It aims at personal improvement through praxis applied at the level of thought and action; it also aims at program and institutional improvement.

X. M. Stevenson, Bob. "Curriculum Materials for United States and Australian Schools: An Explanation of the Theory-Practice Gap in Environmental Education?". Wisconsin Center for Education Research, University of Wisconson-Madison, School of Education, 1025 West Johnson Street, Madison 53706, USA.

The Theory-Practice Dilemma

A number of authors have noted a discrepancy between internationally accepted objectives for environmental education, as expressed in the Belgrade Charter and the Tbilisi Intergovernmental Conference Report, and the objectives emphasized in school programs in both the United States (Childress, 1978; Hungerford, Peyton & Wilke, 1980) and Australia (Robottom, 1982). This apparent inconsistency has been attributed in part to "the inherent difficulties confronting a curriculum developer charged with the task of translating what are actually general goals into manageable instructional objectives" (Hungerford, et al, 1980).

On the other hand, Robottom (1982) proposed that the discrepancy can be explained by teachers' dominant presuppositions (often subconscious) about knowledge, teaching and schooling. These presuppositions include: (1) knowledge is discipline-based, objective, and value-free; (2) teaching is the authoritative imparting of factual information which is manifested in a didactic approach to instruction with an almost exclusive reliance on texts and other second hand data sources; and (3) the purpose of schooling is the socialization of students and the maintenance of the existing social order. Such generally held presuppositions, argued Robottom, are highly consistent with an emphasis on the knowledge or informational dimension of environmental education, but in conflict with a problem-solving and action orientation.

Curriculum materials, when available, frequently serve as the major resource for teachers involved in curriculum planning for environmental education. Therefore it is appropriate to examine whether curriculum materials reflect the international philosophy of environmental education: an initial condition for establishing a congruency between theory and practice in schools. However, if an analysis of the materials should reveal a consistency with the rhetoric, then it cannot be immediately assumed that their use will ensure the same objectives that will be emphasized by schools.

Analysis of U.S. Materials

Four sets of North American environmental education materials were selected from a small number nominated by two environmental educators who were familiar with materials that had been prominent in schools up to 1981. Only curriculum materials that were multi-grade, with secondary grade levels included (e.g., K-12, 7-12), and inter- or multi-disciplinary were considered.

A content analysis of these four sets of materials was carried out using 28 sub-goal statements developed by Hungerford, Peyton and Wilke (1980) as the criteria for evaluation. These statements, which were published subsequent to the development of all the materials analyzed, had been validated by the authors against the five Tbilisi categories of objectives (or more accurately, general goals). Each set of materials was closely examined for statements of objectives and a conceptual framework that could be compared with the 28 sub-goals. Then activities were reviewed to further ascertain the objectives implied by their content and suggested instructional strategies. Thus both stated and implicit objectives were considered in analyzing the intentions of the particular materials.

There was a very close match between curriculum goals related to the knowledge dimension of environmental education (i.e., the development of conceptual understandings about the environment) and the explicit and implicit objectives of all four sets of materials. Two sets, Project Learning Tree (P.L.T.) and "Teaching Activities in Environmental Education," were perfectly and highly matched respectively on objectives concerned with the two categories of attitudes (and values) and skills for environmental investigations. The other two materials embraced only half or less of the curriculum goals in these two categories. A reasonable degree of congruency was evident again in P.L.T. and Teaching Activities in relation to objectives concerned with environmental problem-solving skills, while both Project I.C.E. and "We Can Help" had a low level of congruency. However, no set of materials paid much attention to the participation or action category.

In order to gain some insights into the developers' conceptions of knowledge and teaching as they relate to environmental education, a second content analysis was conducted using five criteria from a series of curriculum implications derived by Stevenson (1981) from the objectives and guiding principles for environmental education (as stated in the Tbilisi (Conference Report). The questions representing these criteria were intended to gauge whether students: are regarded as active participants in the construction of knowledge: and are involved in making decisions with respect to both their own learning and alternative actions on environmental issues. To summarize the results of this analysis, the majority of materials did not infer the use of a didactic teaching approach, but neither did they advocate a student-directed one.

Thus the idea of student autonomy in decision-making on environmental issues and in taking action on those decisions is not an integral part of United States curriculum materials--at least not in the sample analyzed in this study.

Analysis of Australian Materials

While the U.S. materials that have been discussed were produced centrally by curriculum development specialists to guide practice, a major project in Australia, the Environmental Education Project (E.E.P.), was designed to stimulate activity in environmental education by capitalizing on existing "exemplary" practices in schools. Essentially teachers were involved in describing their own "tried and tested" programs or activities, but additionally some theoretical perspectives and suggestions for practical activities were produced. Five sets of materials were published: "A Sourcebook for Primary Education", "A Sourcebook for Secondary Education", two booklets of activities entitled "Streets" (for urban environments) and "Exploring Outdoors" (for natural environments), and a planning simulation exercise called "Walmit Divided".

The project's philosophy of environmental education, which is detailed in the two sourcebooks, is consistent with the international rhetoric that emerged from Belgrade and Tbilisi. While the E.E.P.'s rhetoric advocated an action orientation to environmental education, a content analysis of the case studies of practice and the three publications of activities revealed a different pattern. Only three case studies and "Walmit Divided" could be regarded as satisfying the participation objective, while an additional three examples described the development of environmental problem-solving and decision-making skills in their programs. The majority of examples, however, represented an emphasis "on the acquisition of knowledge about the environment through the exercising of process skills in the environment" (Robottom, 1983). Thus in the case of these Australian materials there exists an overt theory-practice gap to which curriculum developers--through their suggestions for practice as well as their selection of exemplary practices--have contributed.

Toward an Explanation of Environmental Education Missing in Action

The literature on both environmental education and citizen action curriculum suggests that the following reasons can be hypothesized for teachers' and curriculum developers' reluctance or unwillingness to incorporate an action dimension, consistent with the rhetoric, in their environmental education programs and activities:

(1) an explicit lack of agreement with the rhetoric on philosophical or political grounds (Robottom, 1983);
(2) implicitly-held conceptions of knowledge, teaching and schooling that are incompatible with an action orientation (Robottom, 1983);
(3) a perceived lack of expertise-either real or imagined (Hungerford et al, 1980);
(4) students' lack of maturity, ability or interest to engage in environmental action (Newmann, 1975); and
(5) perceived community resistance-either real or imagined (Newmann, 1975).

Although some teachers disagree with the international rhetoric of environmental education for political reasons, a survey by Childress (1978) found that 75% of teachers rated political justification as being at least of some influence on the rationale for their program or project. This suggests the need to search further afield for a more adequate explanation than political dissonance.

Evaluations of the piloting of a program involving student participation in citizen action helps illuminate the validity of the other hypotheses (Newmann, 1979; Kelly, 1980). Lack of student interest in action projects was not found to be a problem--provided the issues on which action was taken were ones that are significant to the students involved (Newmann, 1979). Similarly, Kelly (1980) did not support the contention that high school students don't possess the ability and maturity to participate in community advocacy but implied that the solution to such problems lies in more staff intervention in group work. Newmann (1981) nominated teacher expertise as the single, most significant factor affecting the successful implementation of action-oriented curriculum; and of the two teachers involved in the pilot program confirmed the need for teachers to have a background in political advocacy (pers. comm., 1981).

Despite being frequently raised by teachers as a likely concern, no evidence of community resistance was encountered in the literature on student action projects. On the contrary, examples were found in both the United States and Australia of environmental action programs that received active community support (Branan & Nathan, 1977; Malcolm, 1981).

In summary, two factors appear to emerge as the real, as distinct from perceived, reasons for the discrepancy between the rhetoric and practice in relation to the action dimension of environmental education. Lack of expertise in political action or advocacy among teachers and curriculum developers is the "technical" inhibiting factor. A more fundamental and serious epistemological and pedagogical problem is the dominant conception of: knowledge as objectively construed; teaching as information dissemination; and schooling as social reproduction. Only the alternative perspective of knowledge as problematic and personal, teaching as the facilitation of critical thinking, and schooling as the fostering of social change, is consistent with the action orientation to environmental education. Environmental education curriculum materials, in their present form and method of development, rather than trying to overcome the obstacles tend to perpetuate them in they way they teach about the environment.

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X. N. Vogl, Robert, Sonia Vogl and William Stapp. "Major Threats to Environmental Quality in North America." Lorado Taft Field Campus, Northern Illinois University, Oregon, Illinois; School of Natural Resources, University of Michigan, Ann Arbor, Michigan.

Introduction

In April, 1984, 150 selected environmental educators from the United States and Canada were surveyed from their opinions regarding issues considered to be threats to environmental quality in North America. The purpose of the study was to reveal which issues seemed the most pressing and to determine areas of agreement and disagreement regarding them.

Background

Ever since the Stockholm Conference in 1972, an effort had existed to bring an international dimension to environmental education. The theme of only one earth has advised us to think globally as we act locally. The goal has been to unite people in seeking their common purpose and shared interest in sustaining a quality life on our planet. The First International Conference on Environmental Education, sponsored by the North American Association for Environmental Education, represents an important effort to examine more of our environmental education efforts from the joint perspective of practitioners in the United States and Canada. By moving toward a North American Continental perspective on environmental education, it becomes important to give some thought to ways in which our educational programs can include a North American perspective while acting within the context of our own local communities.

Certainly many of our serious environmental problems extend beyond national boundaries. Problems like acid rain affect large eco-systems and large numbers of people. Despite their large scale impacts, they are proving exceptionally difficult to resolve.

Resolving problems that transcend national boundaries is not easy since nations find it difficult to give up political autonomy; and since the costs of controlling such problems are often large, one nation might benefit more from polluting the other than it would gain from controlling the problem. While that is neither proper nor desirable, it is an important consideration as to why such problems will continue to prove difficult to solve.

However, the promise of the environmental movement has always been that through education we can change perceptions and behavioral patterns and bring about the needed reforms. No other choice exists but to try, for if we do not, the prognosis is clearly gloomy.

Our hope has always rested in creating an informed public willing to press for needed reforms.

This study is an effort to try to find some common ground from which environmental education can incorporate a broad North American perspective.

The object of this survey was to garner the opinions of environmental educators in both the United States and Canada to reveal their priorities regarding environmental issues on which to focus attention and the availability of educational materials for the issues. Responses are subjective and some disagreement will persist over the relative importance of each issue, but it is always surprising how much general agreement emerges through such a survey.

Procedure

Instrument. It was felt at that time that a revised statement, reflecting concerns for the 1980s and beyond, was necessary. A list of such concerns appeared in the December, 1983 issue of the *Conservation Foundation Newsletter*. The list included 47 issues which were considered the most important current threats to environmental quality. It was generated through six separate surveys of international scientists and other knowledgeable individuals.

Survey. In April, the survey was sent to 100 selected environmental educators from the United States and 50 from Canada. Those surveyed were recommended by William Stapp of The University of Michigan and Charles Hopkins of the Toronto Board of Education. In forming the lists, balanced representation from the two countries, types of organizations, and geographical areas were sought. Survey participants were asked to indicate on a scale of one to five the relative importance of each issue to environmental quality in the United States and Canada; to rank on a scale of one to five the relative availability of educational materials to present each issue; to list educational materials they were aware of which do an adequate or better job of presenting each issue to general audiences and to students; and to list their own top priorities for environmental education in North America. Personal data was also solicited.

Results. Sixty percent of each group responded.

In order to limit the discussion to key issues, mean scores for each issue were computed. Items were rank ordered according to means, and placed into quartiles. Items in the first quartile were considered essential to focus on in the immediate future; those in the fourth quartile were considered of low priority; and those in the second and third quartiles for each group of respondents were compared to extreme items to test for agreement between groups.

Actual mean scores were also considered in addition to quartile placement. Issues with mean scores of 2.0 or less were considered to be extremely important; those with mean scores of 3.0 or more of low importance.

Nine items were placed in the first quartile by both U.S. and Canadian respondents. Both groups considered one item to be extremely important: #25 - Hazardous waste management received a mean score of

1.87 from U.S. respondents and 1.85 from Canadians.

The item ranked highest by U.S. respondents, with a mean score of 1.86, was: #32 - Groundwater and drinking water contamination. It was also placed in the first quartile by Canadian respondents.

Not surprisingly, the item Canadian respondents considered to be the most important, with a mean score of 1.65, was: #23 - Acid deposition. U.S. respondents revealed a growing awareness of the problem, also placing it in the upper half of the first quartile.

Other items placed in the first quartile by both U.S. and Canadian environmental educators included: #31 - Toxic pollutants in surface water; #33 - Pesticides; #13 - Radioactive waste disposal; #43 - Damage to the marine environment; #11 - Sprawl problems (land usage); and #36 - Soil erosion and overexploitation of agricultural soils.

All other items placed in the first quartile by U.S. respondents: #27 - Toxic pollutants in air; #9 - Population growth; #37 - Loss of agricultural land due to desertification and urbanization; and #17 - Solid waste disposal, were placed into the second quartile by Canadians, indicating some agreement. All other items placed into the first quartile by Canadian respondents: #39 - Ocean fisheries depletion; #30 - Non-point source water pollution; and #2 - Nuclear accidents and terrorism, were placed into the second quartile by U.S. respondents, again indicating some agreement.

Availability of materials was divided into two categories: those items with a mean score of less than 3.0 had readily available materials; those with a mean score of 4.0 or more had inadequately available materials. U.S. respondents felt that only 11 issues had readily available materials, while Canadians felt that 19 issues had readily available materials. However, Canadians felt that four of the issues had inadequate materials, but placed these four issues into the fourth quartile, and considered three of them extremely unimportant.

Respondents from the U.S. felt that of the important issues, only the issues of population growth, acid deposition, and solid waste disposal had adequate materials, while Canadians felt that all important issues except those of ocean fisheries, depletion, nonpaint source water pollution, and nuclear accidents and terrorism had adequate materials. Since disparity existed between United States and Canadian views on the availability of materials, it is possible that curricula could be exchanged, limiting the amount of work necessary before adequate educating on the issues can occur.

Canadian personal priorities. Personal priorities of Canadians focused on attitudes, values, and skills, environmental education, and the specific issue of acid rain. Developing attitudes and values that lead to environmentally sound lifestyles, and examining personal, social, and global values were mentioned. Comments included:

- We need to develop an environmental ethic; too much emphasis has been placed on cognitive, not affective, learning; and
- We have developed the skills, we now need to develop an environmental ethic which encourages people to stand up and be counted for what they believe.

However, some disagree. One commented:

- We need a rational approach; attitudes and values have not been very productive.

Numerous comments were made regarding environmental education; it was considered central to all education. Direct experiences and involvement with natural resources for children, teachers, the public, and industrialists in order to develop a commitment to proper stewardship was considered essential. Several respondents felt that critical thinking, problem solving, and analysis and communication skills need to be developed. Networking, reassessment, and upgrading environmental education programs were mentioned as well as examining and assessing information and learning to influence public opinion. One respondent suggested developing an analytic approach to all 47 issues.

Economic constraints on degradation, anything that degrades natural resources, population concerns, maintaining ecological processes and genetic diversity, and insuring a quality environment for future generations were specific priority issues.

Several listed personal priorities from the list of 47; the most commonly mentioned was acid deposition. One respondent felt that the nuclear threat is key to all issues.

U.S. personal priorities. Personal priorities of U.S. environmental educators focused on the social/political system, environmental education, and specific issues. The elimination of causes rather than symptoms, developing a sense of community, and working on the political and economic bases of problems were seen as key action areas. One respondent stated that the U.S. and Canada must play a key role in helping other countries curb population. Another expressed the belief that the underlying issue was that of government corrupted by industry, and the inequalities in the battle between citizens and conservation groups and government and industry which are unwillingly funded by taxpayers and consumers. The inability of the existing social/political system to use already existing scientific knowledge to cope with problems was seen as a weakness.

Environmental education was seen as an important priority area for the U.S. Both cognitive and affective skills were seen as important. Comments included:

- Don't develop 100% cognitive courses as science education did;
- Develop cognitive and learning skills to deal with problems;
- Develop critical thinking abilities;
- Students must learn to make effective environmental decisions;
- Change schools to involve students in community issues;
- EE must move beyond awareness to allow for decision making, problem solving, and action;
- The primary goal is to develop action-oriented citizens who will not only be willing to take action but will have the skills to discern the appropriate action to take, regardless of the issue priority.

A number of respondents listed as their major personal priorities issues from the list of 47. Other included nuclear war and total environmental destruction, population, and hazardous wastes.

U.S. and Canadian priorities. Working on improving the effectiveness of the social/political system, and improving environmental education programs appear to be top priorities for U.S. environmental educators, while developing personal attitudes, values, skills, and environmentally sound lifestyles, developing effective environmental education programs for all sectors, and a basic concern for natural resources in general appear to be top priorities for Canadian environmental educators.

Summary

This survey reveals that a fair amount of agreement exists between environmental educators from the United States and Canada regarding the importance of selected threats to environmental quality in North America. The issues identified generally have an opportunity to be acted upon locally, which should reduce their adverse effects on a continental basis and perhaps in some cases, on a global basis.

Both groups placed high priority on hazardous waste management, groundwater and drinking water contamination, acid deposition, toxic pollutants in drinking water, pesticides, radioactive waste disposal, damage to the marine environment, sprawl problems, and soil erosion and overexploitation of agricultural soils. U.S. respondents also placed high priority on toxic pollutants in the air, population growth, loss of agricultural land due to desertification and urbanization, and solid waste disposal. Canadian respondents also placed high priority on ocean fisheries depletion, nonpoint source water pollution, and nuclear accidents and terrorism.

Both groups felt that the important issues of population growth, acid deposition, and solid waste had adequate educational materials; while the important issues of ocean fisheries depletion, non point source water pollution, and nuclear accidents and terrorism had inadequate materials. Canadians felt that inadequate materials exist for the other important issues, while U.S. respondents did not.

A long educational process will be necessary to develop a citizenry with a global perspective on environmental issues. While an issues approach is necessary to point out the dangers from current practices, we need to include a synthesizing message of how all people will benefit from pollution control.

X. O. Yambert, Paul A., Ronna F. Dillon and Carolyn F. Donow. "Egocentric to Egocentric: Assessing Changes in Environmental Knowledge, Ethics and Behavior." Professor, Department of Forestry; Associate Professor, Department of Educational Psychology; Researcher, Department of Forestry; Southern Illinois University at Carbondale, Carbondale, Illinois 62901, USA.

The Tennessee Valley Authority sponsors residential environmental camps at Land Between the Lakes (LBL), an area of Kentucky and Tennessee. Our project is part of an existing program for school children who are in the grades 5-8. The project has several goals, two of which are to (a) enhance students' experiences at the camp and to (b) evaluate the effectiveness of the camps's programs by measuring changes in students' environmental knowledge, environmental ethics, and environmentally responsible behaviors. Three steps in our approach to enhancement and evaluation of the existing program are briefly outlined as follows.

Our first step was to identify basic themes that apply to the many topics that are customarily taught in environmental education. The three broad themes that we identified are spatial, temporal and congeneral.

The spatial theme stresses that we should be concerned about the whole ecosystem, not just the local area where we live. Elementary school children are typically egocentric and tend to think almost exclusively about their own immediate surroundings. The thrust of the spatial theme is to determine whether our treatments can extend students' awareness to include environments that are spatially remote. Acid deposition, world hunger, and population pressures are issues that readily relate to this theme.

The temporal theme expresses a concern for the future. Because of students' natural egocentricity, they tend to think about only a small slice of time--their time. Since many environmental issues question how and if future generations of animals and plants will live, the thrust of the temporal theme is to determine whether we can extend students' awareness to include a concern for future generations. Some examples of ideas that are included in the temporal theme are fossil fuels, nuclear waste, and renewable energy resources.

The third theme, congeneral, encourages students to think about the needs or the rights of all life forms, not just people's rights. We assess whether the students tend to move from a solely anthropocentric to a more nearly ecocentric perspective as a result of treatments stressing the complex interrelationships that are inexorably a part of our world. Examples of ideas that are included in the cogeneral theme are food chains, the web of life, and environmental impact. The underlying premise is that the commonly accepted goals of environmental education cannot be attained unless the students' conceptual horizons are expanded in space, time and species. However, these rather philosophical themes need to be presented in environmental topics that are relevant for students in the elementary grades. We wanted the topics to serve as the content basis for enhancement activities and for the test items on the evaluation instrument.

Once we defined the basic themes and the topics of concern, our second major step in the LBL project was to develop a test, "You and Your Environment," to evaluate the effectiveness of the camp program. The multiple choice test had twenty-four questions equally divided across the six content areas.

The six topics selected were: energy, pollution, interrelationships, impacts, cycles, and quality of life. The hierarchial framework for these concepts is shown in Figure 1 and may be interpreted as follows. "Quality of life" was chosen as the comprehensive area subsuming the other five areas. The broad definition of "life" provided a basis for incorporating attitudes and knowledge that are not limited to the human role in the ecosystem. This perspective was of special significance because our work involves attempting to gain insights into possible extensions of ecological concern assessed by the criteria of remoteness in time, space, or species.

Among the numerous factors that collectively determine quality of life, interrelationships and impact were chosen as representative. Interrelationships are, of course, the essence of ecology, and understanding interrelationships is prerequisities to ecological reasoning. Impact was chosen as a basic concept since it provides a perspective for assessing both the effects upon ecosystem components and also effects caused by them. Impacts may be seen as interrelationships viewed in narrower and sharper focus. Pollution and cycles were selected as basic concepts because they are respectively specific examples of impact and interrelationships. The concepts of cycles was broadly interpreted to include both natural, i.e., biogeochemical cycles, and the cycling and recycling efforts of people. Energy was chosen as the final concept because of its key role in the functioning of both human and natural ecosystems. In summary, an attempt was made to select a modest number of concepts, which comprised a representative sample and were meaningfully related.

Energy items centered on the necessity to use energy efficiently and to understand the role of renewable energy resources. Environmental impact items assessed the students' understanding of how various user behaviors alter the environment. Pollution items dealt specifically with pollution-related decisions that typically affect large groups of humans, other animals, and plants. Interrelationships items pertained to the importance of the "web of life" and to how all forms of life are dependent upon each other. Cycles items required students to think about natural cycles and the manner in which matter is recycled in nature so that it can be reused. Quality of life items pertained to all life forms. Items tapped issues such as sharing natural resources with other animals, concern for individuals from less-advantaged countries, and concern for the welfare of future generations.

The test was also divided into two basic areas, environmental knowledge and environmental ethics. Two knowledge and two ethic questions deal with each of the six topics.

The ethics questions were based on Kohlberg's theory of the three levels of moral development: preconventional, conventional, and postconventional levels (Kohlberg, 1982). As a brief review, at the preconventional level, people respond to the rules of good and bad behaviors because of the physical consequences of action or the power of an authority figure. At the conventional level, people conform to rules because of loyalty to the family, group or nation and a desire to maintain the social order. At the postconventional level, individuals attempt to define moral values and universal principles apart from the authority of the group holding these principles.

Although Iozzi's Environmental Issues Test (Iozzi, 1978) was based on Kohlberg's theory, we wanted a test that would measure both environmental ethics and knowledge. To keep the format similar for both areas, we decided to use multiple choice questions and construct the response options or distractors of the ethics questions to correspond to the three levels of moral development. In an attempt to gain insight into developmental levels, the students were instructed to mark two answers, the one that they agreed with the most and the one that they agreed with the least. An example of an ethics question and the developmental level each foil represents is:

We should recycle aluminum cans because:

M L A. we can get money for them (preconventional)
M L B. scouts, schools and other groups want us to recycle (conventional)
M L C. recycling can save energy (postconventional)

The knowledge questions are similar except that only one foil is correct.

The test-retest reliability of the test was .75. Validity data indicated that students' scores correlated significantly with standardized test scores measuring science (.62) and social science (.84) and with teachers' ratings (.60). (See Table I and Table II).

The test, "You and Your Environment," is used to measure environmental knowledge and environmental ethics, but unobstrusive observations are used to measure environmentally responsible behaviors. Food waste in the dining room and use of electricity in the dorms are the two unobstrusive observations selected because they met our criteria of being readily quantifiable and indicative of total group behaviors.

A third step in the LBL project was to develop activities and materials to enhance the already existing program. A slide presentation and a pamphlet were designed to encourage students to think about environmental issues from spatial, temporal and congeneral perspectives. Both the slide presentation and the pamphlet contain similar content and pictures so that the effect of slides versus pamphlet can be measured. At the annual teacher workshop, attended by most of the classroom teachers who bring students to LBL, we introduced activities that the teachers could use with their students at LBL and in their classrooms.

Table I

Test-Retest Data

	Number of students	$r_{1,2}$*	x_1*	x_2*
(24) Total Score	27	.75 (P .0001)	13.67 (SD=3.51)	13.04 (SD=3.75)
(12) Knowledge Items	27	.63 (P .0004)	5.93 (SD=1.57)	6.00 (SD=1.82)
(12) Ethics Items	27	.74 (P .0001)	7.74 (SD=2.33)	7.04 (SD=2.56)

*r1,2 = Correlation Between the First Test and the Retest

*x1 = Means and Standard Deviations on the First Test

*x2 = Means and Standard Deviations on the Retest

Table II

Correlations between Standardized Tests and YYE

	Reading	Social Studies	Science	Math
Total Score	.63 (.004)	.84 (.001)	.62 (.04)	.72 (.0005)
Knowledge Items	.66 (.002)	.72 (.01)	.52 (.10)	.63 (.003)
Ethics	.51 (.03)	.80 (.003)	.60 (.05)	.65 (.002)

Data have been analyzed on 547 students from ten different schools. These schools constituted the control group in our experimental design since none of the enhancement activities were implemented yet. Data from the experimental groups will be analyzed soon. One experimental group was comprised of those schools whose teachers attended the workshop and agreed to use the suggested techniques. Another experimental group saw and discussed the slide presentation, and the third experimental group read and discussed the pamphlet. All of the schools took the test, "You and Your Environment," and the unobstrusive observations were made.

Linkages among environmental knowledge, ethics, and behavior are still far from being well understood. It is our hope that this continuing study will add further insights.

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